EIS
Douglas-fir
1999

Volume I

Region 1 | Region 6

Douglas-fir *Beetle Project*

Regenerated Forest

FINAL

Environmental Impact Statement

Aquatic Restoration

for the
Idaho Panhandle
National Forests
and
Colville National Forest

Fuels Reduction

1999

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Idaho Panhandle National Forests
Coeur d'Alene River and Priest Lake Ranger Districts
Kootenai, Shoshone, and Bonner Counties, Idaho

Colville National Forest
Newport Ranger District
Pend Oreille County, Washington

Douglas-fir Beetle Project
Final Environmental Impact Statement
June, 1999

Lead Agency: USDA Forest Service

Responsible Officials:

David J. Wright, Forest Supervisor
Idaho Panhandle National Forests
3815 Schreiber Way
Coeur d'Alene, ID 83815

Robert L. Vaught, Forest Supervisor
Colville National Forest
765 South Main
Colville, WA 99114

For Further Information Contact:

Idaho Panhandle National Forests
Brad Gilbert
3815 Schreiber Way
Coeur d'Alene, ID 83815
(208) 765-7223

Newport Ranger District
Nancy Glines
315 N. Warren Ave.
Newport, WA 99156
(509) 447-7300

ABSTRACT

The Idaho Panhandle (IPNF) and Colville National Forests have proposed ecosystem restoration activities in response to a serious Douglas-fir beetle outbreak in northern Idaho and northeastern Washington. Nine analysis areas have been identified within the Coeur d'Alene, Priest Lake and Newport Ranger Districts. These analysis areas include entire watersheds where the beetle is known to have infested timber stands and where risks to other ecosystem components are present. The purpose of the project is to respond to the Douglas-fir beetle outbreak by restoring vegetation and aquatic ecosystems, using timber harvest and the recovered value to accomplish the restoration objectives. The project would implement vegetation restoration, aquatic restoration, and fuels reduction activities. This action needs to proceed as quickly as possible to maximize restoration opportunities in the beetle-infested areas.

The Final Environmental Impact Statement (EIS) displays the actions proposed by the IPNF and Colville National Forests, provides an assessment of the scope and analysis of potential treatment alternatives, addresses public concerns and recommendations, describes the key changes that have been made to the analysis and documentation between the Draft and Final EIS's (including new alternatives and modifications to alternatives), and the environmental effects that could occur under each alternative.

Six alternatives were initially developed in response to the major issues identified during environmental analysis (Alternatives A through F). **Alternative A** (No Action) would defer all activities which are not part of current management in the areas. **Alternative B** (the Proposed Action) would begin vegetation restoration and reduce hazardous fuels in currently infested and high hazard forest stands and repair or remove associated roads which pose risks to watersheds and aquatic habitats. **Alternative C** would treat known areas of infestation with the same balanced approach as Alternative B, but would not construct new roads. **Alternative D** varies from Alternative B by including high hazard stands which currently have few beetle-attacked trees but have a high potential for additional beetle-killed trees. The high hazard stands would only be treated if infestations actually spread or increase in these areas. **Alternative E** would remove only dead trees and would not treat designated old-growth management stands. **Alternative F** would focus on reducing risks to homes and properties next to beetle-infested National Forest System lands. **Alternative G** was developed based on public comments on the Draft EIS, to analyze and display the effects of implementing the proposed restoration activities without commercial timber harvest. **Alternative D is the Forest Service's preferred alternative at this time for both National Forests.**

There will be two decision documents (Records of Decision) issued; one for each of the two National Forests.

Copies of this EIS are available in paper format or on compact disc (CD) from the Idaho Panhandle and Colville National Forests Supervisor's Offices, and on the Idaho Panhandle National Forests' internet site at www.fs.fed.us/ipnf/dfbugs.

FINAL ENVIRONMENTAL IMPACT STATEMENT
DOUGLAS-FIR BEETLE PROJECT

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CHAPTER III - AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, continued
Affected Environment and Environmental Consequences on the Priest Lake Ranger District
Affected Environment and Environmental Consequences on the Newport Ranger District
Conclusions

ACRONYMS/GLOSSARY
LIST OF REFERENCES
LIST OF PREPARERS
LIST TO WHOM COPIES OF THE DOCUMENT HAVE BEEN SENT

APPENDICES

Appendix A - Public Involvement and Response to Comments
Appendix B - Threatened, Endangered and Sensitive Plants*
Appendix C - Noxious Weeds*
Appendix D - Unit and Road Information
Appendix E - Reasonably Foreseeable Activities
Appendix F - Best Management Practices

Appendices B and C are bound separately and are available upon request from the IPNF and Colville National Forests Supervisor's Offices, at the addresses shown below.

Larger-scale maps are contained in the Project Files and are also available upon request.

Copies of this Final EIS are available on compact disc (CD) from the Idaho Panhandle and Colville National Forests Supervisor's Offices, and on the Idaho Panhandle National Forests' internet site at www.fs.fed.us/ipnf/dfbugs.

Idaho Panhandle National Forests ..... Colville National Forest
3815 Schreiber Way .....765 South Main
Coeur d'Alene, ID 83815 .....Colville, WA 99114
(208) 765-7223 ..... (509) 684-7000

CHAPTER I PURPOSE AND NEED FOR ACTION

INTRODUCTION

Douglas-fir beetles are a normal component of northern Idaho and northeastern Washington ecosystems. Snow, ice and wind during the winter of 1996-97 damaged trees in Northern Idaho and Eastern Washington, setting the stage for a rise in the number of beetles in the forest.

These beetle populations increased in damaged and weakened trees in 1997 and emerged the following spring to attack live, standing trees. Drought conditions during the summer of 1998 further increased the severity of this outbreak. Estimates made in September of 1998 were used to assess the magnitude of the outbreak on the two National Forests affected, the Idaho Panhandle (IPNF) and the Colville (CNF).

Beetles are now emerging from trees infested in 1998 and are attacking additional live, standing Douglas-fir trees and killing them. Area entomologists estimate that mortality occurring in 1999 and subsequent years of the outbreak will equal that which occurred in 1997 and 1998. Douglas-fir beetles, regardless of how many beetles are in an area, prefer big trees because they provide the best conditions for the beetles to complete their life cycle. The largest Douglas-fir are most susceptible to attack and mortality.

The Douglas-fir beetle infestation on these National Forest System lands is so widespread, management action will not control or stop this outbreak. Instead, the outbreak has caused us to focus on areas where the beetle is causing substantial Douglas-fir mortality. The death of these large trees will lead to high levels of fuel accumulation, and natural regeneration of more shade-tolerant tree species (Douglas-fir, grand fir), which are already overly abundant compared to historic conditions.

Organization of the Document

This Environmental Impact Statement (EIS) displays the actions proposed by the Colville and Idaho Panhandle National Forests to address forest ecosystem conditions which are changing due to an outbreak of Douglas-fir beetle and to incorporate principles of ecosystem management into activities being proposed in response to those changed conditions.

This document provides an assessment of the scope and analysis of potential treatment alternatives of the Douglas-fir beetle outbreak on the Priest Lake and Coeur d'Alene River Ranger Districts of the Idaho Panhandle National Forests, and the Newport Ranger District of the Colville National Forest.

The Final EIS is organized to display information that is common to all three ranger districts in Chapters I and II and in most of the appendices. Chapter III, which describes existing environmental conditions and potential effects, is organized by ranger district. Therefore, if you are only interested in one district, you can read about it separately.

One reason the Final EIS is so large is that the dispersed nature of the project over three ranger districts requires similar discussions over multiple analysis areas. For the reader's sake, relevant information was often repeated to avoid causing the reader to continuously reference other sections.

Chapter I outlines the background and purpose and need for the action. Chapter II presents the key resource issues within the area and describes the No-Action Alternative and six action alternatives for comparison. Chapter III describes the existing conditions and the changes that would occur to resources under implementation of each alternative. Direct, indirect and cumulative impacts are discussed.

The Map Packet provided with this EIS shows the vicinity of the project within northern Idaho and northeastern Washington. The packet also contains maps which display the areas analyzed under this EIS, the proposed activities and alternatives to the proposal. Maps with greater detail are available at the Priest Lake, Coeur d'Alene River and Newport Ranger District offices as well as the Forest Supervisor's Office in Coeur d'Alene, Idaho and on the Idaho Panhandle National Forests' internet site at www.fs.fed.us/ipnf/dfbugs.

The Appendices contain specific or supplemental information that further explains discussions in the main chapters. Additional report and analyses documentation have been referenced or developed during the course of this project, but were not included in this document either because they were technical in nature or were of excessive length. Those items are referred to as being part of the "project files." Project files for the activities in the Newport portion of this EIS are available for review at the Newport Ranger District office in Newport, Washington. Please call (509) 447-7300 if you would like to review the Newport files. Project files for the activities in the Priest Lake and Coeur d'Alene River Ranger District portions of this EIS are available for review at the Forest Supervisors's office for the Idaho Panhandle National Forests in Coeur d'Alene, Idaho. Please call (208) 765-7223 if you would like to review the project files for the Priest Lake or Coeur d'Alene River Ranger Districts.

Large Scale Ecosystem Setting

Interior Columbia Basin Ecosystem Management Project

This analysis was guided by integrated ecological assessments and strategies that began in 1993 by direction from President Clinton to "develop a scientifically sound and ecosystem based strategy for management of eastside forests." This direction resulted in the combined Bureau of Land Management and Forest Service project known as the Interior Columbia Basin Ecosystem Management Project (ICBEMP)[1].

This assessment covers the "interior" portion of the Columbia River basin and those portions of the Klamath and Great Basins within Oregon. This includes the states of Oregon and Washington east of the crest of the Cascade Mountains, most of Idaho state and small portions of northern Nevada, western Montana and western Wyoming for a total of 145 million acres. Of that, federal lands encompass 76 million acres (lands administered by the USDI, Bureau of Land Management and USDA, Forest Service).

Research data from the scientists involved in the Interior Columbia Basin Ecosystem Management Project has been released. Disturbances related to fire and insect mortality have played an important role in determining forest composition throughout the interior Columbia Basin. Forested ecosystems have become more susceptible to severe fires and outbreaks of insects and diseases.

At the Interior Columbia Basin scale, the findings for the river basins on the two Forests show that the river basins have a low composite ecological integrity primarily due to past alterations. Further findings show low forest integrity throughout, mixed low to moderate aquatic integrity, and mixed low, moderate and high integrity hydrologic conditions. The large scale assessment identified risks to ecological integrity from severe stand-replacing fire potential, risks to aquatic and hydrologic integrity due to high road densities, and risks to terrestrial species due to habitat degradation.

[1] *Quigley, T., Haynes, R., Graham, R.; 1996. Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin, pages 14, 16, 61, 113, 115, 116.*

Northern Region Assessment

The Northern Region Overview, which covers northern Idaho and Montana, focused on priorities within northern Idaho and Montana for restoring ecosystem health and availability of recreation opportunities. The assessment describes the changes in vegetation that are contributing to the current beetle infestation.

> *"In northern Idaho and moist portions of western Montana, Douglas-fir was largely an early succession species that regenerated well after wildfire in various mixes with white pine and larch, but then was largely eliminated by root disease and beetles after 100-140 years, giving way to pine and larch. In the absence of white pine and larch, we have experienced an increase in Douglas-fir during early succession, and an apparent increase in root disease inoculum levels as succession proceeds. When Douglas-fir dies in stands now, the result is an effective 50-150 year acceleration of succession to grand fir and hemlock. This condition with heavy root disease and ladder fuels promotes and increases risk of stand-replacement fire." (Northern Region Overview Detailed Report; USDA October, 1998, page 22)*

> *"The most significant societal and ecological risk is associated with fire; particularly where ladder fuels exist or are developing near or adjacent to urban interface locations." (Northern Region Overview; USDA October, 1998. page 24)*

The Northern Region Overview Summary explores this Region's situation with regard to ecosystem health and recreation. Ecosystem health was once referred to by ecologist Aldo Leopold as the capacity of the land for self-renewal. Ecological integrity, as discussed in the Columbia Basin and step-down assessments, is the wholeness or completeness of an ecosystem, the degree to which it has all the parts and processes it needs to function properly (Northern Region Overview Summary, USDA April, 1999. pages 3-6).

Characteristics of ecosystems with high integrity are:

- *Resiliency - the ability to withstand fires and other disturbances*
- *Supportive of native and desired non-native species diversity*
- *Consist of a mosaic of well-connected habitats.*
- *Have functions, such as seed dispersal and decay, and processes, such as nutrient and water cycles, that operate effectively (ICBEMP Summary, 1996)*

The Northern Region Overview findings conclude that there are multiple areas of concern in the Northwest Zone of the Region, but that "this subregion holds the greatest opportunity for vegetation treatments and restoration with timber sales. From a social and economic standpoint, using timber harvest for ecological restoration would be a benefit to the many communities which still have a strong economic dependency, more so than in other zones in the Region. Aquatic restoration should be focused on specific needs based on the zone aquatic restoration strategy." The timber management (timber harvest) tool best fits with the forest types in northern Idaho and is essential, for example, to achieve the openings needed to restore white pine and larch, and maintain upland grass/shrub communities. (Northern Region Overview Summary, USDA April, 1999. page 9)

Geographic Assessments

Concurrent with this Northern Region study, the Idaho Panhandle National Forests began gathering more detailed ecosystem information for the major river basins within the Forests. These subbasin reviews, called Geographic Assessments (GAs) throughout this document, are essentially step-down integrated ecosystem assessments at a mid-scale landscape level. Assessments are being conducted for the St. Joe and Coeur d'Alene River Basins/Geographic Areas, and the Priest, Pend Oreille, and Kootenai River Basins/Geographic Areas of the Idaho Panhandle National Forests. For further descriptions of the Geographic Assessments, please refer to the "Vegetation" section in Chapter III for each District.

Watershed Assessments

The six-step process outlined in the "Ecosystem Analysis at the Watershed Scale" (Regional Interagency Executive Committee and Intergovernmental Advisory Committee, 1995) was followed for analysis areas below the Geographic Assessment scale for this EIS. This watershed-scale analysis uses information from the previous two step-down assessments (ICBEMP and Geographic Assessment) and does further analysis to identify current and reference conditions, to identify key issues, to synthesize and interpret analyses results, and to develop recommendations.

The watershed analysis process was also followed on the Newport District on the Colville National Forest and resulted in the New Moon Ecosystem Analysis at the Watershed Scale (1996), which covers part of the area infested by beetles.

1998 Outbreak Incident Assessment Team Report

The Outbreak Incident Report issued on November 12, 1998 was a large-scale analysis of current conditions of the Idaho Panhandle National Forests and part of the Newport Ranger District on the Colville National Forest in regard to the Douglas-fir beetle. This report assessed two things: (1) How many acres of stands are there that would provide good habitat for the Douglas-fir beetle (based on a hazard rating system), and (2) Which watersheds currently have high levels of Douglas-fir beetle infestations in them (which we called "risk" areas).

To determine how susceptible stands are to Douglas-fir beetle attack, a "hazard rating system" was developed by area entomologists. The hazard rating system was then compared to data from stand examinations, timber sale cruise information and satellite imagery. Stands with few Douglas-fir, or smaller, younger Douglas-fir are not as susceptible to beetle attack and received a "low hazard rating." Stands that have high numbers of large, old Douglas-fir received a "high hazard rating."

Moderate and high hazard stands are those in which the Douglas-fir beetle has the potential to kill a substantial portion of the stand. However, beetle-caused mortality is also occurring in low hazard stands where susceptible Douglas-fir are present. Across the Idaho Panhandle National Forests, there are approximately 250,000 acres of moderate and high hazard stands. On the portion of the Newport Ranger District (Colville National Forest) that is east of the Pend Oreille River there are approximately 12,000 acres of moderate and high hazard stands.

Watersheds having a large number of stands with a moderate to high hazard rating for potential beetle infestation but without epidemic numbers of beetles as of the fall of 1998 were called "hazard areas." These areas were not included in the proposed action in the Douglas-fir Beetle Project Final EIS, since they had lower probability of attack during the current epidemic. Eleven hazard areas were identified in the assessment.

Groups of watersheds that had high beetle populations were considered "risk areas" and were included in the proposed action in the Douglas-fir Beetle Project Draft EIS. These "risk" areas became our analysis areas in the EIS. Nine risk areas were identified in the assessment. These areas are shown on the maps located in the map packet and the size of the areas is described in Table I-1.

Outbreaks of Douglas-fir beetle are usually short-lived, rarely lasting more than 4 years. Aerial surveys taken the fall of 1998 identified patches of fading trees which were being killed by the Douglas-fir beetle. On the IPNFs, there were 23,000 acres of these patches. On the east side of the Newport Ranger District of the Colville National Forest, there were 783 acres of beetle mortality. According to the scientist's discussion on December 15, 1998, the current outbreak in its first year is already larger than the most recent outbreak in north Idaho in 1987-1990 (comments from Sandra Kegley in "Key Points from Information Sharing regarding

the Douglas-fir Beetle and Management Alternatives", John Schwandt, Coeur d'Alene, ID.) The current beetle outbreak could be as large as previous outbreaks that occurred in the early 1950's and 1970's.

Utilizing the scientific findings from the IPNF Geographic Assessments for those areas infested by the beetles, the interdisciplinary team prioritized those watersheds most in need of treatment, and developed ecosystem guidelines and recommendations for each of the watersheds. As a part of this analysis ecological information was gathered also on the road restoration needs that were affecting hydrologic, aquatic and wildlife conditions. The field verification of infested trees provided information on stands of Douglas-fir which were most likely to be attacked by the beetles. This information was then used to project an estimated number of acres that could potentially become infested on the IPNF and Newport Ranger District if current climatic conditions and insect populations continued at their present rate. The amount of moderate and high hazard acres within each analysis area are shown below. The acres shown in the table are approximate.

Table I-1. Moderate and High Hazard Acres On National Forest Systems Lands Within Analysis Areas.

EIS Analysis Area*	Analysis Area Approximate Acres***	Moderate & High Hazard Approximate Acres
Coeur d'Alene River Ranger District		
Hayden	41,400	4,600
CDA Lake	117,300	11,000
Chain Lakes	56,200	2,400
Steamboat	8,800	1,300
Bumblebee	14,100	1,300
Hart	19,600	2,500
Priest Lake Ranger District		
Lakeface-Granite	15,400	1,787
Lower Priest	130,410	6,151
Newport Ranger District		
Newport Analysis Area**	59,212	8,796
Total	**462,422**	**39,834**

** Identified as Risk Areas in the 1998 Outbreak Assessment Report*

*** The Newport analysis area is outside the existing New Moon timber sale contract area on the east side of the Pend Oreille River and only includes areas of high beetle infestation.*

**** Analysis Area acres include all lands including private ownerships.*

Aerial surveys and on-the-ground reconnaissance were used to map proposed treatment unit boundaries which included areas currently attacked by beetles. Ground reconnaissance of areas identified in the aerial survey showed that the deciding factor as to whether a stand was considered "attacked" was how close it was to an area of down and damaged Douglas-fir. Stands that had been rated as "low hazard" using the hazard rating system from the incident outbreak assessment, were being attacked by Douglas-fir beetle if they were near blowdown areas. Conversely, moderate and high "hazard" stands were not necessarily being attacked in the fall of 1998 if they were far enough away from the blowdown areas. So the definition of high hazard stands at this project scale of analysis includes proximity to blowdown and already infested areas as well as stand characteristics. These factors were used to evaluate where the beetles would probably go next and how likely those stands would be to suffer high mortality.

The No-Action Alternative (described in detail in Chapter II), displays an estimate of the number of acres both within and outside proposed treatment units that are projected to be infested by the time the current epidemic runs its course. These estimates are based on the entomologist's predictions that as of the spring of 1999, the forest has experienced only about half the mortality that will probably result from this epidemic.

Fuels and Fire Risk

Present day forest structure has changed to various degrees from its historic stand structure in part due to effective fire exclusion, accidentally introduced white pine blister rust, and past logging. Since the late 1930s, fire control efforts have become more effective. The primary impact of fire control has been to eliminate underburns and mixed severity fires which served as the thinning agents that favored larch and ponderosa pine. Accounts of early-day logging are presented in greater detail in the "Vegetation" sections of the Final EIS.

The balance between fire and natural decomposition of dead wood in these forests has been disrupted. A current danger is from fuel accumulations so high that burns are extremely hot, resulting in wildfire that could be unsafe for firefighters and that could destroy most of the trees, known as a stand-replacing fire. The effectiveness of fire prevention and suppression has permitted increased ground fuel accumulations and stratified fuels (both living and dead) to the point where many fires can not be contained or confined. They now burn hotter and more extensively, on the average, than even 10 years ago.

More people now live in urban and rural settings adjacent to or within areas of wildland vegetation that historically experienced frequent non-lethal and mixed severity fires. With changes in forest conditions, these areas are now more prone to lethal stand-replacing fires (ICBEMP, USDA, USDI 1996.) More detailed information on potential for wildfire is located in the Chapter III "Fuels and Fire Behavior" section for each of the Ranger Districts.

Location

The area covered by this project analysis is illustrated in the Vicinity Map located in the map packet. In general, it is described as National Forest Systems Lands scattered within Kootenai County, Shoshone County, and the western area of Bonner County, in Idaho. In Washington state it includes National Forest System Lands in the eastern portion of Pend Oreille County bounded on the south and west by the Pend Oreille River, south of Browns Lake, and adjacent to the Idaho Panhandle National Forests.

Nine areas have been analyzed; six on the Coeur d'Alene River Ranger District (Kootenai and Shoshone Counties), two on the Priest Lake Ranger District (Bonner County, Idaho and Pend Oreille County, Washington), and one on the Newport Ranger District (Pend Oreille County, Washington). These analysis areas include watersheds where the beetle is known to have infested timber stands and where risks to other ecosystem components are present.

These analysis areas and their watersheds are as follows.

On the Coeur d'Alene Ranger District;

- Hayden Analysis Area
- Coeur d'Alene Lake Analysis Area (Fernan, Wolf Lodge, Nettleton, Fourth of July, Cedar Creek, Beauty Creek, Carlin Creek, and other watersheds)
- Chain Lakes Analysis Area
- Steamboat Analysis Area
- Bumblebee Analysis Area
- Hart Analysis Area (Hart Creek and Beaver Creek watersheds)

On the Priest Lake Ranger District:

- Lakeface-Granite Analysis Area
- Lower Priest Analysis Area (Binarch-Lamb area watersheds, Upper West Branch area watersheds, Lower West Branch area watersheds, and Quartz area watersheds).

On the Newport Ranger District:

- Newport Analysis Area (Pend Oreille Face, Browns Lake, Skookum, Indian Creek, Bead Lake and Marshall subwatersheds).

Current Law and Forest Plan Direction

This analysis was guided by federal and state law, including the Forest and Rangeland Renewable Resources Planning Act (RPA), National Forest Management Act (NFMA), National Environmental Policy Act (NEPA), and Clean Water Act.

General management direction for the Idaho Panhandle National Forests and the Colville National Forest is found in the Land and Resource Management Plans and amendments for each Forest, identified throughout the remainder of this document as "Forest Plans." This project document tiers to those two Forest Plans. The Inland Native Fish Strategy (INFS) was prepared in July, 1995, to provide interim direction to protect habitat and populations of resident native fish outside of anadromous fish habitat in eastern Oregon, eastern Washington, Idaho, western Montana, and portions of Nevada (USDA Forest Service, 1995), and this Strategy amended both Forest Plans.

The Inland Native Fish Strategy (INFS) adopted in 1995 provides interim direction for inland native fish by reducing the risk of loss of populations and reducing potential negative impacts to aquatic habitat.

Regional direction for the Colville National Forest is specifically different from the Idaho Panhandle National Forests in the Pacific Northwest Region's Continuation of Interim Management Direction Establishing Riparian, Ecosystem, and Wildlife Standards for Timber Sale Environmental Assessments, hereafter called the Regional Forester's Amendments Nos. 1 and 2, or "Eastside Screens" (USDA Forest Service, 1994 and 1995), and from the Managing Competing and Unwanted Vegetation Final EIS and Mediated Agreement (USDA Forest Service, 1988). These amendments to the Colville Forest Plan narrow the range of alternatives for proposed activities on the Colville National Forest.

The direction under the Eastside Screens include the Riparian Standard under the Inland Native Fish Strategy, an Ecosystem Standard, and a Wildlife Standard. In summary, the emphasis is to maintain late and old structural forest stands, to compare current structural stages with historic conditions, to avoid treatment that results in a change outside the Historic Range of Variability for the biophysical environments, and to maintain stands for wildlife habitat through snags, downed woody material, connectivity, and enhancement of late and old structure. A full description of the Newport District analysis under the Eastside Screens is included in the Project Files.

The Region 6 screens include the following items:

Riparian (INFS): allow salvage and fuelwood cutting in Riparian Habitat Conservation Areas (RHCAs) only where present and future woody debris needs are met, where cutting would not retard or prevent attainment of other Riparian Management Objectives (RMOs), and where adverse effects to inland native fish can be avoided.

Ecosystem: Structural stages 6 and 7 are considered "late and old structure". When one or both types of late and old-structure stands are below the historic range of variability in a particular biophysical setting within an analysis area, then there should be no net loss of late and old structure from timber sale activities.

Wildlife: Trees over 21 inches diameter at breast height (dbh) are to be maintained. Connectivity is to be maintained between late and old-structure stands, pine marten management areas, pileated woodpecker management areas and Management Area (MA) 1. Snags are to be retained at levels to provide 100 percent population potential for primary cavity excavators. Down logs are to be protected at levels specified in the Regional Forester's Amendments Nos. 1 and 2. Goshawk nests are to be protected.

Forest Plan Management Area Goals, Standards and Guidelines

Management Areas described below are estimated amounts within each analysis area; this does not indicate acres of treatment. Treatment acres are discussed in alternative descriptions in Chapter II.

Idaho Panhandle National Forests

Management Areas on the Idaho Panhandle National Forests are described on pages III-1 through III-87 of the IPNF Forest Plan. National Forest System Lands affected by the Douglas-fir beetle outbreak fall within Management Areas (MA's) 1, 4, 6, 9, 14, 16, 17, and 19.

Management Area 1 (about 91,500 acres of Coeur d'Alene River Ranger District, about 111,600 acres of Priest Lake District). Management Area 1 consists of lands designated for timber production distributed throughout the Forest.

Management Area 4 (about 65,000 acres of Coeur d'Alene River District, about 23,000 acres of Priest Lake District). Management Area 4 consists of lands designated for timber production within big game winter range.

Management Area 6 (about 4,600 acres of Coeur d'Alene River District; Priest Lake Ranger District contains no MA 6 areas). Management Area 6 consists of lands designed for timber production and within important elk summer range habitats.

Management Area 9 (about 19,400 acres of Coeur d'Alene River District, about 9,000 acres of Priest Lake District). Management Area 9 consists of areas of non-forest lands, lands not capable of producing industrial products, lands physically unsuited for timber production, and lands capable of timber production but isolated by the above type lands or non-public ownership.

Management Area 14 (about 3 acres on Coeur d'Alene River District, about 1,300 acres on Priest Lake District). Management Area 14 consists of areas to be utilized for scientific research and includes the existing and candidate Research Natural Areas (RNA's) and experimental forests.

Management Area 16 includes floodplains, wetlands, and all areas within a horizontal distance of approximately 100 feet from the normal high water line of a stream channel or from the shoreline of a standing body of water. MA 16 areas are distributed throughout the Forest.

Management Area 17 (about 370 acres of Coeur d'Alene River District). Management Area 17 consists of existing and proposed developed recreation sites. These sites are scattered throughout the Forest and include such areas as campground, picnic areas, ski resorts, boating facilities, etc.

Management Area 19 (about 450 acres on Coeur d'Alene River District). Management Area 19 consists of a cross section of National Forest System lands which have a high value for semi-primitive recreation as well as timber production.

Colville National Forest

Management Areas within the planning area on the Colville National Forest are described in the Colville Forest Plan on pages 4-35 to 4-60. Six Management Areas (MA's) are affected (MA's 1, 3A, 5, 6, 7 and 8).

MA 1 Old Growth Dependent Species Habitat (about 1,180 acres) The management goal is to provide essential habitat for wildlife species that require old-growth forest components, and contribute to the maintenance of diversity of wildlife habitats and plant communities.

MA 3A Recreation (about 3,078 acres) The management goal is to provide roaded and unroaded recreation opportunities in a natural appearing setting.

MA 5 Scenic/Timber (about 10,180 acres) The management goal is to provide a natural appearing foreground, middle, and background along major scenic travel routes while providing wood products.

MA 6 Scenic/Winter Range (about 6,489 acres) The management goal is to provide a natural appearing foreground, middle, and background along major scenic travel routes while providing for winter range management.

MA 7 Wood/Forage (about 5,703 acres) The management goal is to manage the land to achieve optimum production of timber products while protecting basic resources..

MA 8 Winter Range (about 4,330 acres) The management goal is to meet the habitat needs of deer and elk to sustain carrying capacity at 120 percent of the 1980 level, while managing timber and other resources consistent with fish and wildlife management objectives.

PURPOSE AND NEED FOR ACTION

The purpose of this project is to respond to the Douglas-fir beetle outbreak by restoring vegetation and aquatic ecosystems utilizing timber harvest and the recovered value to accomplish the restoration objectives. Funds would be used to plant ponderosa pine, western larch and blister rust resistant western white pine, improve drainage structures on roads, close unneeded road segments, reconstruct roads, relocate roads, and remove hazardous fuels.

The project would implement vegetation restoration, aquatic restoration, and fuels reduction activities in areas identified as priority in the Outbreak Incident Assessment Team Report (Outbreak Report). In order to maximize restoration opportunities this action needs to proceed as quickly as possible. The Outbreak Report recommended taking advantage of the opportunities provided by the vegetation restoration efforts to implement inventoried aquatic and terrestrial restoration opportunities in the beetle-infested area.

The need for the proposed action is generated by the difference between current and projected conditions in the project areas and the desired conditions for resources. The Proposed Action is designed to improve current conditions associated with the Douglas-fir beetle infestations and move them closer to the desired conditions. The comparison of current and desired conditions, summarized below, incorporates Forest Plan Management Area direction and goals, large scale assessment knowledge, the Outbreak Incident Assessment Team Report, and the latest entomology and pathology expertise.

Fisheries and Wildlife Habitat

Current Condition: In many of the watersheds where the beetle infestations are occurring, existing roads are affecting fish habitat and wildlife security. Shifts away from channel stability in streams, caused by roads and other management activities, have resulted in a changed structure and function of stream ecosystems and a decline in many native fish populations. In some areas, roads on the landscape have compromised wildlife security.

Desired Condition: Watershed systems are maintained or improved to promote dynamic equilibrium within their stream systems. Stream and water quality are maintained and fully support beneficial uses of the water. Road densities are reduced and wildlife habitat security is improved.

Forest Fuels

Current Condition: Because of effective wildfire suppression since the 1930s and the broadscale change in species composition of the forest, high fuel levels have been building for the last several decades. Many Douglas-fir trees are dead and dying, and understories with large components of Douglas-fir are providing ladder fuels (forest fuels, normally green foliage, arranged in a vertical pattern that enable a ground fire to climb into the tree crowns). The large trees now dying from the beetle attack are adding to these fuel levels. This is especially of concern in areas where private lands are close to National Forest. Due to the number of snags, a wildfire could be unsafe for fire fighters and it could be so intense it could be difficult to control. The result could destroy most of the trees (a stand-replacing fire), and possibly destroy private property. These high-intensity wildfires could also have severe consequences to other vegetation, soils, stream networks and the visual quality of landscapes.

Desired Condition: Fuel loadings are reduced to levels where cost-effective resource protection is possible should a wildfire start. The reductions in fuel loadings also preserve short term options in stands that are important for wildlife habitat.

Vegetation

Current Condition: Our forests are now made up of almost twice as much Douglas-fir as what was historically present. This is part of a broadscale reduction in species that are potentially long-lived under local climatic regimes (white pine, ponderosa pine, and western larch), and their replacement by either early seral species that tend to be shorter-lived under local climatic regimes (Douglas-fir and lodgepole pine), or late seral species (grand fir and western hemlock) that are highly stressed by the periodic droughts that are part of normal local climatic variation. These species shifts are due to decades of fire exclusion, white pine blister rust, and past logging practices. The change in composition of tree species, especially in older forests, has also affected wildlife habitat and the species that depend on it.

Desired Condition: Some infested stands are trending toward late and old structure through thinning, and as beetle mortality increases, stands lost to beetle kill are regenerated to long-lived seral species such as ponderosa pine, larch and western white pine. Stands that have moved toward historic vegetation composition are better suited to adapt to disturbance.

Social Values

Current Condition: Trees killed by the Douglas-fir beetle will lose a portion of their value as sawtimber each year they remain unharvested. Based on a review of research completed for this EIS (Projected Deterioration of Beetle-killed Douglas-fir on the Idaho Panhandle National Forests, David Evans and Associates, January, 1999), there are cases where trees killed by Douglas-fir beetles and subsequently infected with decay fungus were not usable as lumber two years after infection. By harvesting infested trees as quickly as possible

(before the economic value is lost), we can provide for the greatest opportunities for long-term restoration within the affected areas, while providing economic benefits to local communities.

Desired Condition: There are benefits to the public from reduction of fuel hazards and reduced risks to watersheds. Salvage of wood fiber from beetle killed trees provides jobs and income to local communities. Ecosystem elements are sustainable and trending toward historic conditions as a result of watershed restoration activities financed by tree harvest.

PROPOSED ACTION

The proposed action is described in this Final EIS as Alternative B. More detailed information is available in the alternative descriptions in Chapter II along with a summary and comparison format at the end of that chapter. Chapter III describes the environmental consequences of implementing the proposed action. The enclosed Map Packet and Appendix D, Unit and Road Information, contain additional site-specific information.

Aquatic, Watershed, and Wildlife Restoration

Aquatic, watershed, and wildlife restoration activities in the Proposed Action would include closing or obliterating roads (for watershed health and wildlife security) and modifying (by reconstruction) other road elements that pose risks to watersheds. Such road work was specifically included and designed to eliminate or reduce adverse effects to streams, fish habitat and migration access, wildlife and wildlife habitat. These activities are described in the document by the following terms: erosion control, reconstruction (light or heavy), road relocation, and obliteration. (Please refer to the Acronyms/Glossary for further definitions.)

Where risks to the aquatic, watershed and wildlife resources were identified and were within the scope of this project, improvement projects are proposed to eliminate or reduce these risks.

This improvement work would be done either by the timber sale purchasers under provisions of the timber sale contract or directly by the Forest Service through other funding sources. Some watershed restoration work would occur within Riparian Habitat Conservation Areas (e.g. obliterating roads crossing streams, installing higher standard culverts, etc.).

Please refer to the Alternative B maps and Appendix D for specific road improvement work proposed in each area by alternative and further descriptions of these treatments. The Appendix D tables also identify which work is proposed primarily for watershed improvement, as opposed to work necessary to provide safe access for vegetation restoration activities.

Erosion control would be used where there is a need to control or reduce road surface erosion. Such activities include use of vegetation and geotextiles. Maintenance and drainage improvement are designed to reduce sediment at stream crossings. Waterbars would reroute sediment-laden water away from streams.

Where the objectives for certain road segments could not be met through erosion control alone, road reconstruction is proposed. Proposed reconstruction would reduce risks of failure and sedimentation. Light reconstruction includes installation of features such as rolling dips, rolling grade, relief culverts, additional gravel surfacing, and armoring of culvert catch basins and outlets. Heavy reconstruction includes modification or replacement of stream crossings, cut or fill slope stabilization, road prism re-alignment, and removal of road fills which are to close to streamsides or riparian areas. Culvert repairs and upgrades would reduce risks of failure or allow fish migration.

In some locations road segments are encroaching into stream channels and riparian areas to such an extent that they are proposed to be relocated. Road realignment or relocation is proposed to reduce road encroachment into riparian areas and remove roads encroaching on the stream channels. This could include

road prism re-alignment or relocation, removing fill from floodplains, recontouring crossings, outsloping, cross drainage, and erosion control.

Road obliteration is proposed where roads would no longer be needed or not needed in the near future, or where other measures could not mitigate the impacts the road is currently having on aquatic resources. Obliteration of roads would remove or recontour features which pose risks to watershed health or wildlife security. It involves activities such as removing or recontouring stream crossings, stabilizing slopes, ripping the tread, installing no-maintenance cross ditches, and revegetation. Obliteration also includes some method of road closure, generally including obliteration and disguise of the beginning of the road segment. Mileages shown in this table are approximate.

Table I-2. Proposed aquatic, watershed, and wildlife restoration road activities.

District	Approx. miles of road obliteration	Approx. miles of road reconstruction	Approx. miles of road relocation	Approx. miles of erosion control and maintenance on roads
Coeur d'Alene	68.0	6.1	0	206.0
Priest Lake	53.0	66.8	0.8	6.0
Newport	3.9	10.6	0	5.5

Activities not associated with timber sales could be completed with other funding. Where activities could be associated with timber sales and along haul routes, aquatic/watershed restoration would be achieved through the timber sale contract.

Fuels treatment

Activities are proposed to treat fuels created by the beetle infestation as well as treating logging slash in the proposed harvest units. Under the timber sale contract, merchantable sawlogs would be removed from the forest. The fuels remaining after harvest would be treated by either burning them in place, piling and burning, yarding tops of trees to landings to be burned, or lopping and scattering tops and limbs to speed decay and make them less flammable.

Table I-3. Approximate acres of proposed fuels treatments.

* *Prescribed burning is burning in place. Pile burning is piling and burning slash. Mechanical treatment consists of yarding the tops of trees to landings to be burned; or lopping and scattering tops and limbs.*

Project Area	Prescribed burning*	Pile burning	Mechanical treatment
Coeur d'Alene River Ranger District	867	89	9,275
Priest Lake Ranger District	3,090	667	1,623
Newport Ranger District	896	0	625
Total	4,853	756	11,523

Vegetation treatment

Timber harvest is proposed only in units currently attacked by Douglas-fir beetle. These would include approximately 15,612 acres on the IPNF and 1,521 acres on the Newport Ranger District of the Colville National Forest.

Regeneration harvest activities would occur in forest stands in which the Douglas-fir beetle has led to or contributed to high mortality in the stand; other disturbance agents which have caused high mortality in the forest stand may include wind, snow, ice, or root disease. This is estimated to total about 4,356 acres across the entire project. Generally, this would include harvest on stands over 5 acres in size where over 50% of the trees are dead, dying or expected to die during the outbreak, with site-preparation and/or fuels hazard reduction, and planting of long-lived seral species. On the Newport Ranger District, regeneration harvest would only be done in stands where the beetles have returned the stand to structural stage 1, stand initiation. These are stands where less than 40 square feet of basal area of live trees remain after the beetle infestation, for a total of about 29 acres. These openings would be irregular in shape and contain small groups of trees and individual trees which are unaffected by the beetles.

Selective harvest would occur in forest stands where less than 50% of the stand is dead, dying, or expected to die from the Douglas-fir beetle and other disturbance agents. However, due to special management concerns such as public safety, visual quality, or specific wildlife habitat requirement, some selective harvest was prescribed in areas where more than 50% of the stand is dead or dying. For Newport, selective harvest would be used in all stands where greater than 40 square feet of live basal area remain. On most areas, selective harvest would remove only dead trees; but in some areas where there is opportunity to maintain or enhance growth of desired western larch or ponderosa pine, or move the stand towards desired structural stages, green trees, may also be removed. These green trees are generally the smaller trees which would be "thinned out". The silvicultural prescriptions include treatments such as salvage, thinning, and improvement cutting. Under the Proposed Action, a total of about 12,777 acres of selective harvest may occur across the entire project.

Vegetation restoration and hazardous fuels reduction activities would include timber harvest and fuels hazard reduction by fire or mechanical methods. Temporary roads would be built to access some stands in the Priest Lake District (about 13.1 miles), and on the Coeur d'Alene River District (about 8.0 miles). These roads would be obliterated after use. No roads would be built on the Newport Ranger District. Approximately 29 miles of road would be reconstructed (13.5 miles on the Coeur d'Alene; 14 miles on Priest Lake; and 1.8 miles on Newport) and approximately 17 additional miles would be maintained.

Noxious weed prevention or treatment methods are included on each district.

The following table shows the relationship between the areas included in the analysis for this EIS and the extent of proposed treatments. Acreages shown in this table are approximate.

Table I-4. Scope of Proposed Vegetation Treatments.

Ranger District and Analysis Areas	Analysis Area Acres*	Proposed Treatment Acres	Percent of Analysis Area
Priest Lake			
Lakeface-Granite	15,400	650	4 %
Lower Priest	130,410	4,731	4 %
Newport	59,212	1,521	3 %
Coeur d'Alene River			
Hayden	41,400	2,489	6 %
Coeur d'Alene	117,300	4,869	4 %
Chain Lakes	56,200	1,877	3 %
Steamboat	8,800	98	1 %
Bumblebee	14,100	106	1 %
Hart	19,600	792	4 %
Total	462,422	17,133	4%

**Analysis Area acres include all lands including private ownerships and bodies of water.*

CHAPTER II ALTERNATIVE DESCRIPTIONS AND COMPARISONS

INTRODUCTION

This chapter discusses the public involvement, issues that were developed, alternatives including the Proposed Action, mitigation measures, monitoring, and presents a comparative summary of the effects of the alternatives.

The project interdisciplinary teams developed alternatives based on concepts and issues tentatively identified in the fall of 1998 by the Outbreak Incident Assessment Team, and further refined by site-specific information and public comment. The alternative development process included three steps:

- *Scoping internally and with the public*
- *Identification of key issues*
- *Identification of issues affected by alternative actions*

SCOPING and PUBLIC INVOLVEMENT

Scoping is the notification and seeking of comment on a management proposal. Scoping is intended to involve the general public early in the process of environmental analysis. Comments from other agencies and the public help to identify significant issues and to eliminate issues which are not significant or which have been addressed by prior environmental review. Public involvement throughout the process reduces delays and leads to better decisions.

Presale work on the Newport District in 1998 was finding dying trees from beetle activity in the New Moon analysis area. In cooperation with Oregon State University, the Newport District set up pheromone bait traps to monitor beetle activity in 1998. Field trips on the Colville National Forest were held in June 1998 to review the Bearpaw Salvage timber sale, the planned New Moon timber sale, screening objectives, and the beetle bait traps. More traps were set up across the district to monitor beetle activity.

Aerial flights for insect and disease detection were flown in August of 1998 by Region 6. On September 3, 1998 a letter to the public was sent by the Newport Ranger District regarding a field trip later that month to show the effects and ask for input. In cooperation with the Idaho Panhandle National Forests, a second aerial flight for insect detection was flown in September of 1998.

Field personnel on the Coeur d'Alene River Ranger District began finding trees dying from Douglas-fir beetle in August 1998. A helicopter reconnaissance flight was done in early September to verify the extent of beetle activity and to see if an additional insect and disease survey flight was needed.

On the Priest Lake Ranger District, many timber stands adjacent to timber blown down in 1997 were monitored by entomologists and district foresters throughout the spring and summer of 1998. In cooperation with entomologists from Oregon State University and the Northern Region of the U.S. Forest Service (Region One), pheromone baited traps were established. Beetle collections were made weekly from these traps and were analyzed to monitor the beetle activity levels. Throughout the summer, this field monitoring indicated large numbers of beetles were present and levels of mortality were increasing substantially. Due to these results, as discussed above, the insect monitoring flights were conducted in September, 1998.

The interdisciplinary Outbreak Incident Assessment Team, consisting of Idaho Panhandle National Forest and Colville National Forest employees, began a combined effort in October, 1998 to evaluate the magnitude of the beetle outbreak, project its future behavior, and develop both short- and long-term strategies for

treatment. (See the November 12, 1998 publication of the Outbreak Incident Assessment Team Report in the project files.)

Internal scoping for the Douglas-fir Beetle Project was done by two interdisciplinary teams with extensive experience in the NEPA process, local conditions, and issues (one team for the Pend Oreille/Priest Area and one for the Coeur d'Alene Area). Issues identified through internal scoping were used as a starting point for proposed action, to develop draft alternatives, and to focus data collection and analysis needs.

Once the specific set of management activities were formulated into the proposed action, public scoping was initiated. A Public Participation Plan was developed to meet requirements for public participation, raise public awareness and solicit public comment early and often throughout the decision making process. The detailed Public Participation Plan is located in the project files.

A news release was published in regional newspapers on October 23, 1998. A Notice of Intent to prepare an Environmental Impact Statement was published in the Federal Register on November 17, 1998. In mid-November, the project proposal was sent to other agencies, people on the mailing list to receive the "Quarterly Schedule of Proposed Actions" for the Idaho Panhandle National Forests, owners of private land adjacent to the project areas, people on the Newport Ranger District mailing list, and others who have indicated interest in the situation. The mid-November proposal described the Douglas-fir beetle infestation, resource conditions, and potential treatments. The proposal was also included in the "Quarterly Schedule of Proposed Actions" beginning in the November, 1998 issue, for both Forests.

News articles and legal advertisements were placed in area newspapers, notifying the public of the project, and issuing an invitation to provide comments and recommendations. Open Houses to provide one-on-one information and receive public comments were held in Priest River, Silverton, and Coeur d'Alene, Idaho, in early December, 1998. Additional meetings were held with federal, state and local agencies and tribal representatives. The team considered concerns expressed by both the public and agency specialists. The Idaho Panhandle National Forest organized a meeting of scientists and Forest Health Protection personnel to discuss the current beetle outbreak, the predicted course of the outbreak, and appropriate management responses.

Comments were received from over 200 individuals, agencies, businesses and organizations before publication of the Draft EIS in January 1999. Public comments were received in the form of letters, electronic mail messages, phone calls, and personal visits. On February 2, 1999, a revised Notice of Intent was published to consolidate analysis of the project into one EIS, and to change the designation of the responsible officials for the project on the Idaho Panhandle from the District Rangers to the Forest Supervisor.

The Draft Environmental Impact Statement (DEIS) was published and mailed on January 19 and 20, 1999 to 168 individuals, agencies and groups for review. More than 300 copies of the DEIS Summary were also distributed. Meetings were held in Kellogg, Priest River, Coeur d'Alene, and Harrison, Idaho to answer questions about the Proposed Action during the 45-day comment period. The Draft EIS presented specific information on the proposal, the alternatives to the proposal, and the results of analysis of the information gathered. The Federal Register Notice of Availability of the DEIS was published on January 29, 1999; this notice incorrectly identified the due date for comments (Federal Register, Vol. 64, No. 19, page 4649). A revised Notice of Availability was published on February 5, 1999 correctly noting March 16, 1999 as the due date for comments (Federal Register, Vol. 64, No. 24, page 5790). During the public comment period on the Draft EIS, a total of 887 telephone calls and letters of comment were received. The review of public input can be found in Appendix A and in the project files. The comments were used to further analyze the proposed action, develop new alternatives, and prepare the Final EIS. Letters from federal and state agencies are included in their entirety with responses to those comments in Appendix A to this EIS.

CHANGES BETWEEN THE DRAFT AND FINAL EIS

Response to substantive comments received during the period for public review and comment on the Draft Environmental Impact Statement included the following changes to this Final Environmental Impact Statement. The public comments and detailed responses to the comments are included in Appendix A.

- **Modification of alternatives, including the proposed action:** All alternatives had some changes based on field verification and further analysis, as well as public comments. For example, units on suitable habitat for some Sensitive species were dropped, fuel treatments were modified in response to soil productivity concerns, the amount of road rehabilitation was increased, and design criteria and mitigation measures were added based on consultation with the US Fish and Wildlife Service.

  All action alternatives are now consistent with Forest Plan standards with the following exceptions:

  1) Under Alternatives B, D and E the Bumblebee Analysis Area on the Coeur d'Alene River Ranger District does not meet water quality standards, because there are no effective restoration actions proposed within the beetle-infested areas to offset the increased risk of installing culverts on an existing road, or a temporary spur road. It can not be adequately demonstrated that the alternatives would avoid contributing to the pollutant that caused a water quality limited segment to be listed (303d).

  2) Alternative G is consistent with the Forest Plans, except for Newport, where it may not meet standards for cover:forage ratio in several proposed prescribed burn units within winter range.

  Permanent road construction under Alternative D (Coeur d'Alene River Ranger District) was modified from about 21 miles to about 5 miles. One mile of these new roads would be new construction to allow the obliteration of a segment of road 1526 which is encroaching on a stream channel.

- **Development and evaluation of alternatives not previously given detailed consideration by the agency:** New Alternative G was developed and is included in this Chapter and Chapter III. Alternative F was expanded to include Priest Lake and Newport Ranger Districts.

- **Supplementation, improvement, or modification of the analyses:** The comparison of alternatives by key issues has been shortened at the end of this Chapter to show a comparison across all three District areas. Chapter III analysis has been modified to respond to public comments including more site-specific discussion, and additional analysis in numerous areas (i.e. fire/fuel, air quality, watershed, finances). Appendix D was added, and road and unit numbers were added to the maps to help the reader track individual activities which have been proposed and analyzed in this document.

- **Correction of errors:** During the comment period, an errata sheet was mailed to the mailing list to correct errors in the Draft EIS Summary and elsewhere. These and other errors pointed out during the review period have been corrected in the Final EIS. See Appendix A, Response to Comments section for additional details.

- **Explanation of why further agency response is not warranted:** Issues outside the scope of the purpose and need or issues about agency policy that are outside the scope have been identified in the Response to Comments section.

Information on other changes is described more fully in the resource sections of Chapter III.

IDENTIFICATION OF ISSUES

A list of preliminary issues was developed by the interdisciplinary teams during project development. After consideration by the interdisciplinary teams, these issues were sorted into categories for resolution.

- **Key issues** are issues used to develop the focus and specific activities of the action alternatives. They sharply define effects of the proposed action and help define the scope of the environmental analyses and documentation.

- **Analysis issues** are issues addressed in the effects analysis and used to compare alternatives. Many of these issues are a part of Forest Plan Standards and Guidelines for resources. They are described in detail and analyzed in Chapter III.

- **Issues not addressed in detail** are issues or concerns either already addressed through alternative design or are outside the scope of this project. There is no further discussion of these issues in Chapter III.

Key Issues

The project alternatives respond to the key resource issues identified during the public involvement and analyses process, to the extent feasible within the physical, biological, and legal limits of forest management. The issues identified are specific to this geographic area and this proposal.

The key issues, described below, that were used to develop the focus and specific activities of the proposed action include:

- level of timber harvest,
- water resources and aquatic habitat,
- road management,
- activities in old growth, and
- fuel loadings.

Key Issue: Level of Timber Harvest

Some people have expressed concern that the proposed project does not capture enough value because it is treating too few forest stands infested by the Douglas-fir beetle. They feel that a loss of timber resource and value would result by not treating additional infested stands. Other people commented that harvesting may cause unwanted effects on forest values such as scenery, water quality, and habitat for certain wildlife species. Some are opposed to any cutting and others felt that harvest should remove only dead trees.

Addressing the Issue: Alternative D was developed to address the concern for not treating additional acres where the beetle infestation would likely spread. To address the concern for harvesting live trees not infested by the beetle, Alternative E was developed. This alternative would harvest only dead and beetle-infested trees. Alternative A (No Action) and Alternative G address the concern for harvest of any trees, living or killed by the beetle infestation. All Alternatives address the issue of no harvesting to some degree.

Issue Indicators: The following measurements are used to evaluate and compare the effects of each alternative in relation to this issue (Table II-1).

Table II-1. Issues and measurements of change associated with vegetation.

Issue or Concern	Measurement of Change
Level of harvest in beetle-infested areas	• Total acres of treatment in stands currently infested by Douglas-fir beetle, • Total acres of treatment in stands potentially infested by Douglas-fir beetle, • Total acres of treatment removing dead and beetle-infested trees only, • Total acres of treatment removing some additional green trees
Changes in cover types	• Acres and % by watershed area (National Forest System lands), • Predominant species by basal area or trees/acre in regenerated stands
Changes in size classes (structural stages for Newport Ranger District)	• Shrubs/seed/sap (0-35 years), • Poles/small-medium sawtimber (36-100 years), • Mature/large (101-150 years), • Old forest (150+ years, but not necessarily allocated old growth), • Allocated old growth

Key Issue: Water Resources and Aquatic Habitat

Some people commented that timber harvest, road construction and reconstruction, and other project activities would result in unacceptable effects to watersheds. While some people are willing to accept short-term negative effects in order to gain long-term benefits to water quality and beneficial uses, other people are not. There are also concerns with the cumulative effects of harvesting in some areas where water quality conditions are already at risk.

The proposed action includes ground-disturbing activities such as timber harvest and temporary road construction, road reconstruction, road obliteration, culvert removal and replacement. The analysis area has high road densities and a number of roads in close proximity to streams. The extent of the beetle outbreak allows an opportunity to treat forest roads that are having a negative effect on aquatic values. In some cases, proposed timber harvest could increase water yields, which could lead to increased sediment movement. Aquatic improvement work could also increase sediment. All these activities could adversely impact beneficial uses such as fisheries and domestic water supplies. However, they could also result in long-term benefits and reduced risks to the watershed.

Addressing the Issue: Alternative E was specifically developed to reduce risks to water resources relative to the proposed action by limiting forest canopy reduction to only that created by the bark beetle infestation. Alternative C addresses concerns about potential watershed effects caused by sediment increases resulting from new road construction. Alternative G, developed in response to comments on the Draft EIS, includes vegetation and watershed restoration activities and no timber harvest. All alternatives address this issue to some degree.

Issue Indicators: The following measurements are used to evaluate and compare the effects of each alternative in relation to this issue.

Table II-2. Issues and measurements of change associated with watersheds, aquatic habitat, and fisheries.

Issue or Concern	Measurement of Change
Erosion and sediment	• Estimated relative sediment loading and trend (% and direction of change)
Runoff modification	• Estimated relative peak flows and trend • (% and direction of change)
Channel conflicts	• Reduction of hydraulic or riparian modifications from encroaching roads (miles)
Stream crossings	• Number of stream crossings, • Risks at crossings (tons per year)
Unstable road segments	• Reduction of at risk road elements (miles) • Net road length (miles)
Fisheries Effects to management indicator fish species	• Length of riparian vegetation removed, • Risk of sediment delivery, • Increased miles of fish migration access, • Miles of encroaching roads, • Effects on species viability

Key Issue: Road Management

Some people object to road construction because of potential effects on forest resources such as water quality and wildlife habitat. Similarly, some support road closures and obliteration to protect resources such as water quality, fisheries, wildlife, and noxious weed prevention. Other people have expressed concern about losing access to the forest because of road closures proposed in this project. Some have expressed support for any additional access that might be provided by this project.

Addressing the Issue: Alternative C was developed to specifically address concern about road construction. The Proposed Action includes construction of some temporary roads on the Coeur d'Alene River and Priest Lake Ranger Districts. These would be obliterated following their use. Additionally, closure or obliteration of some existing roads is being proposed to reduce the existing high road densities, to lessen their effects and risks to watersheds and to increase wildlife security habitat. All alternatives limited new road restrictions to roads where alternate local access exists or there were no other viable alternatives to mitigate the risks these roads pose to aquatic or wildlife resources.

Issue Indicators: The following measurements are used to evaluate and compare the effects of each alternative in relation to this issue.

Table II-3. Issues and measurements of change associated with road management.

Issue or Concern	Measurement of Change
Road Construction	• Miles of permanent road constructed • Miles of temporary road constructed
Road Reconstruction	• Miles of roads reconstructed
Road Access	• Miles of existing open roads obliterated/removed • Open road density

Key Issue: Activities within Old Growth

Some members of the public feel that harvesting within old growth is inappropriate and that old growth structure can not be improved upon or maintained through timber harvest or fuel reduction. Others question the need to retain stands of dead trees which have lost their old growth character.

Addressing the Issue: Alternative E was developed to specifically address this issue by not proposing any activities in old growth areas. All Alternatives address this issue to some degree.

Issue Indicators: The following measurements are used to evaluate and compare the effects of each alternative in relation to this issue.

Table II-4. Issues and measurements of change associated with old growth.

Issue or Concern	Measurement of Change
Old growth	Acres of treatment within old-growth areas

Key Issue: Fuel loadings

The public has raised concerns about the threat of fires escaping from National Forest System lands and endangering private land values. This threat is increased with the higher fuel levels resulting from the beetle infestation. This is especially of concern in areas where people are building residences close to forested areas (the wildland urban interface). Some private large land owners are concerned about the threat of fires from National Forest entering their lands. Others stated that the proposed activities should only take place near urban or private land areas.

Addressing the Issue: Alternative F was developed to specifically address concerns about the fuel loadings by concentrating fuels-reduction activities in areas adjacent to private property and the urban interface. All Alternatives address this issue to some degree.

Issue Indicators: The number of acres of fuel accumulations not receiving treatment and acres of prescribed burning are the measurements used to evaluate and compare the effects of each alternative in relation to this issue.

Table II-5. Issues and measurements of change associated with fire and fuels.

Issue or Concern	Measurement of Change
Fuel loadings	Fuels accumulation acres which would remain untreated
Fuel Treatment	Acres of Prescribed Fire

Analysis Issues

Many people were concerned about effects of the alternatives on various resources. These resources are managed under Forest Plan Standards and Guidelines. Effects are described in detail in Chapter III for the following:

- Vegetation (including old growth, and Sensitive plants)
- Threatened, Endangered and Sensitive Plants
- Noxious Weeds
- Watershed
- Soil Productivity
- Fisheries
- Fuels and Fire Behavior
- Air Quality
- Wildlife (including Threatened, Endangered and Sensitive; and Management Indicator Species)
- Recreation
- Scenery
- Heritage and Tribal Interests
- Finances
- Transportation Planning

Other Issues

Some other issues that were brought up are managed through regulation, law and policy, or would not be affected by this decision. These issues, listed below, will not be discussed further.

Environmental Justice: Effects of various levels of timber harvest activities and watershed restoration work are concentrated on National Forest System lands. No population or group of peoples, minority, low-income, or other groups is expected to be disproportionately impacted.

Mineral resources would not be affected because of the nature of the activities.

Modifications of Allotment Management Plans would not occur and analyzing the need for them is outside the scope of this analysis.

No activities are proposed in Rare II Roadless Areas, Forest Plan Inventoried Roadless or Research Natural Areas.

Native American issues were discussed in a government-to-government consultation process with the affected Tribes. Disclosure of those discussions are in letters between the parties in the project analysis files.

Explanations of Terminology Used in the Alternatives

An explanation of terminology used to describe proposed methods (silvicultural practices as well as road obliteration, construction and reconstruction) is provided on a 8X10-inch card provided in the Final EIS, and in the Glossary.

ALTERNATIVE DESCRIPTIONS

The following alternatives were developed based on the key issues discussed above, with design features and mitigation related to the issues and public concerns. The discussions and tables provide a summary of activities proposed in each of the three Ranger District areas and total activities under each alternative.

For Alternatives B through G please see the sections in Chapter II entitled Design Features Common to All Action Alternatives, and Mitigation for a complete description of additional activities that would occur, if any of these alternatives are selected. Also see the map packet and Appendix D for individual unit and road activity descriptions.

The objective in all action alternatives is to treat forest stand and fuel conditions which are resulting from the beetle infestation, as well as reduce the existing watershed and wildlife risks associated with roads. The objective of this project is not to cut a certain amount of timber volume or treat specific numbers of acres or certain number of miles of roads. Acres, miles, other amounts, and mapped unit boundaries which are used to describe these alternatives are approximations based on the best available information. Final on-the-ground results of selecting any of the alternatives (including the "No Action" alternative) are likely to vary somewhat from what is displayed here.

Alternative A (No Action)

Alternative A is the No Action alternative. This alternative is required by law and serves both as a viable alternative in itself as well as a baseline for comparison of the effects of all the alternatives. No Action means that the proposed timber harvest, reforestation, fuels reduction, aquatic rehabilitation, and road obliteration activities described in the Proposed Action would not be initiated at this time. Under No Action there would be no change in current management direction or change from the level of ongoing management intensity within the project area. Alternative A addresses the public concern to not harvest any trees, whether living or killed by the beetle infestation.

While this alternative doesn't propose any new management activities, the project is somewhat unique because the beetles would still result in relatively fast changes in the vegetation in the forest stands where the insects are active (please refer to the Alternative A maps in the map packet which identify known and projected beetle infestation areas). In this case, No Action would still result in visible and measurable changes caused by the beetle activity.

For further discussions and explanations of the current epidemic and projected spread, please see each district's "Vegetation" section in Chapter III.

Work previously planned within the project area on each district would still occur under this No Action Alternative (See Appendix E, Reasonably Foreseeable Activities). Effects of these activities, along with those of the beetle infestation, are included in the effects discussions for this alternative in Chapter III.

Alternative B (Proposed Action)

Alternative B represents the Proposed Action. It is designed to treat only the units which include known 1998 beetle infestations. The primary focus of this alternative is to show a balance of watershed improvements, vegetation rehabilitation, and reductions in hazardous fuels.

Alternative B has been designed to begin vegetation restoration of infested areas by using timber harvest to trend forest stands towards later structural stages (i.e. larger trees), or to maintain or plant early seral conifer species such as white pine, western larch, and ponderosa pine. Some temporary road construction is

proposed on the Coeur d'Alene River and Priest Lake Ranger Districts to access infested stands for harvest. These roads would be obliterated after use.

Timber harvest and subsequent prescribed burning or mechanical fuel treatments are designed to reduce hazardous fuels and in some areas facilitate reforestation.

Of the improvement work proposed for existing roads with this alternative (see Alternative B table below and enclosed maps), 85% is designed specifically for watershed or wildlife habitat improvement and 15% is designed primarily to facilitate safe access for timber harvest (see Appendix D for individual road information).

Watershed improvement work would be accomplished through either timber sale contracts or through other funding sources. Neither are dependent on the timber sale being bid up to accomplish this work.

Vegetation Treatments

Regeneration harvest and selective harvests are planned in forested units currently infested by the Douglas-fir beetle. Alternative B avoids harvest within infested stands of moist-site old growth and stands with low infestation levels. Additionally, this alternative does not include treatment of nearby stands not currently infested by the beetle but which are at risk of becoming infested in the next two years.

Regeneration harvests: Regeneration harvests are proposed on approximately 852 acres on the Coeur d'Alene River Ranger District, approximately 3,475 acres on the Priest Lake Ranger District, and approximately 29 acres on the Newport Ranger District. Regeneration harvests would range in size from 5 to approximately 140 acres. Generally, these regeneration harvests would retain less than 30% of the trees remaining on the area.

In some cases, regeneration openings on the Coeur d'Alene and Priest Lake Districts would exceed 40 acres and, when considered with existing adjacent openings, could reach up to several hundred acres in size. These harvest units are located where Douglas-fir beetles, in conjunction with root disease and storm damage of 1996-97 are projected to kill the majority of trees in large areas. Because these openings are a result of natural occurrences, approval by the Regional Forester of the Northern Region is not required (USDA Northern Regional Guide, Chapter 2 and 36 CFR 219.27 (d)(2)(iii)). These openings would be irregular in shape and contain small groups of trees and individual trees unaffected by the beetles. Some green trees may be removed to improve survival and growth of early seral species. Adequate trees would be retained for structural diversity, wildlife snags, long term site productivity, and site protection.

Regeneration harvest on the Newport portion of the project would only be done in stands where the beetles have returned the stand to structural stage 1, stand initiation. These are stands where less than 40 square feet of basal area of live trees remain after the beetle infestation, for a total of about 29 acres. No live trees 21" DBH or larger (except for incidental trees removed for safety reasons or to create corridors for yarding logs) would be removed on the Newport District in order to be consistent with Regional Forester's Amendments No. 1 and 2. (Pacific Northwest Region only). Similarly, there would be openings created by the beetle that would exceed 40 acres on Newport District, but approval of the Regional Forester of the Pacific Northwest Region would not be required. (USDA Pacific Northwest Regional Guide, and 36 CFR 219.27 (d)(2)(iii)).

Appendix D also lists which harvest units may have openings which could exceed 40 acres in size, either by themselves or because of adjacency with existing openings.

Alternative B provides for planting approximately 3,260 acres to long lived early seral species (ponderosa pine, white pine, or western larch) in these regeneration harvested areas (approximately 29 acres on Newport, 2,380 acres on Priest Lake, and 852 acres on the Coeur d'Alene River Ranger District). These planted stands

are also more likely to provide a long term improvement in stand structure since the long lived early seral species are generally less susceptible to root disease than Douglas-fir and grand fir.

Selective harvests: On most areas where beetle-caused mortality is light, selective harvest would remove only dead and dying trees (except for incidental trees removed for safety reasons or to create corridors for yarding logs). On some areas, where there is the opportunity to enhance the growth of the desired long lived seral tree species, or move the stand towards desired structural stages, some green trees in addition to the dead Douglas-fir would be removed.

As a guide, selective harvest treatments were recommended in stands where Douglas-fir beetle would kill less than 50% of the large trees; on Newport Ranger District, selective harvest was proposed in stands with greater than 40 square feet of live basal area remaining after beetle mortality. Selective harvest was also recommended in areas of special management need or where public safety issues are a concern. Along with timber harvest, brush disposal efforts, including burning, lopping, scattering and piling are proposed to reduce fuels hazards.

Under this alternative, entry for selective timber harvests are proposed for approximately 9,379 acres on the Coeur d'Alene River Ranger District, approximately 1,906 acres on the Priest Lake Ranger District, and approximately 1,492 acres on the Newport Ranger District.

Selective harvests in old growth: On the Priest Lake District, there would be approximately 300 acres of selective harvesting within infested dry-site old growth stands under this alternative (Units f10, f13, m04, m24, m33, q16, q24, q28, q36, and t26). These are stands which were historically open grown ponderosa pine with frequent low intensity fires that killed very few of the large trees. Due to the amount of dead and dying Douglas-fir in these stands, they are at risk from a high-intensity fire that would kill the large ponderosa pine. In order to maintain these ponderosa pine stands as old growth, the dead and dying Douglas-fir and understory trees that are forming a fuel ladder need to be removed. By harvesting these trees and underburning, these stands can be maintained longer as old growth ponderosa pine. This activity does not apply for the Coeur d'Alene River or Newport Ranger Districts.

Aquatic Restoration

Aquatic restoration activities are proposed, and specifically target recognized risks in watersheds where beetle mortality is occurring.

To develop this alternative, each road was analyzed for existing risks to watershed. Where risks were identified and were within the scope of this project, improvement projects are proposed to eliminate or reduce these risks. These include activities such as culvert repairs, reconstruction, obliteration, road realignment, road relocation, and road maintenance and drainage improvements.

Road maintenance and drainage improvement activities are designed to reduce sediment at stream crossings. Road drainage improvements such as waterbars would reroute sediment-laden water to the forest floor away from streams. Culvert repairs and upgrades would reduce risks of failure or allow fish migration. Reconstruction is proposed on many roads to reduce risks of failure and sedimentation. Road obliteration is proposed where roads would no longer be needed or not needed in the near future. Road realignment is proposed to reduce road encroachment into riparian areas and road relocation to remove roads encroaching on the stream channels (see the Alternative B maps and Appendix D for specific road improvement work proposed in each area by alternative and further descriptions of these treatments. The Appendix D tables also identify whether this work is proposed primarily for watershed improvement or to provide safe access).

This improvement work would be done either by the purchaser of the timber sales under provisions of the timber sale contract or directly by the Forest Service through other funding sources. Some watershed

restoration work would occur within Riparian Habitat Conservation Areas (e.g. obliterating roads crossing streams, installing higher standard culverts, etc.).

Fuels Treatment

Alternative B would treat fuels created by the beetle infestation as well as logging slash in all proposed harvest units. Under the timber sale contract, merchantable sawlogs would be removed from the forest. The fuels remaining after harvest would be treated by either burning them in place ("Rx burn" in the table below), piling and burning (pile), yarding tops of trees to landings to be burned (mechanical), or lopping and scattering tops and limbs to speed decay and make them less flammable (mechanical).

Regeneration on the Newport District is restricted to areas where beetle mortality leaves less than 40 square feet of basal area; no live trees 21 inches in diameter at breast height or larger would be cut.

Table II-6. Activities proposed under Alternative B, by Ranger District and project area.

Vegetation Restoration approximate acres					Aquatic Restoration approximate amounts					Fuels Treatment approximate acres		
Watershed	Regen acres	Select acres	Mi. Rd. Const*		Miles of Road**			# stream crossings removed or improved	fish migration miles accessed	Rx Burn	Pile	Mech.
			Temp	Perm	Rem	Rec	Rel					
Coeur d'Alene River Ranger District												
Hayden	388	2101	1.3	0	11	5.7	0	16/20	0.4	299	89	2,106
Chain Lakes	155	1722	1.3	0	11	4.2	0	28/14	0.5	155	0	1,722
CDA Lake	109	4,760	1.7	0	42	7.0	0	75/35	1.2	213	0	4,651
Bumblebee	19	87	0.7	0	0	1.9	0	0/2	0	19	0	87
Steamboat	0	98	0.8	0	4	0.0	0	7/3	0	0	0	98
Hart	181	611	2.0	0	0	0.8	0	0/5	0	181	0	611
Subtotal CDA	852	9,379	7.8	0	68	19.6	0	126/79	2.1	867	89	9,275
Priest Lake Ranger District												
Lakeface - Granite	548	102	0	0	10.8	1.5	0	6/1	3.6	215	43	391
Lower Priest	2,927	1,804	13.0	0	42.2	79.3	0.8	37/49	2.0	2875	624	1232
Subtotal Priest Lake	3,475	1,906	13.0	0	53.0	80.8	0.8	43/50	5.6	3090	667	1623
Newport Ranger District												
Newport	29	1,492	0	0	3.9	12.4	0	0/3	0	896	0	625
Total all districts	**4,356**	**12,777**	**20.8**	**0**	**124.9**	**112.8**	**0.8**	**169/132**	**7.7**	**4,853**	**756**	**11,523**

* *Temp = Temporary Road, Perm = Permanent Road. Temporary roads would be removed after use, but are not counted again in the column for miles of road to be removed.*

** *Rem = Removal (Obliterated), Rec = Reconstruction, Rel = Relocation*

Forest Plan Consistency: Under Alternatives B, D and E, water quality standards in the Bumblebee Analysis Area on the Coeur d'Alene River Ranger District would not be met, because there are no effective restoration actions proposed within the beetle-infested areas to offset the increased risk of installing culverts on an existing road, or a temporary spur road. It can not be adequately demonstrated that the alternatives would avoid contributing to the pollutant that caused a water quality limited segment to be listed (303d).

Alternative C

To address the public's concern over construction of any new roads, the proposed action was modified to produce Alternative C. Alternative C also addresses concerns about potential watershed effects by eliminating new road construction as a potential source of sediment. Alternative C features are similar to Alternative B, with the exception that no new roads (permanent or temporary) would be constructed. This change alters the proposed logging systems in some units, and occasionally log haul routes, from those proposed in Alternative B.

Alternative C has been designed to begin vegetation restoration of infested areas by using timber harvest to trend forest stands towards later structural stages (i.e. larger trees), or to maintain or plant early seral conifer species such as white pine, western larch, and ponderosa pine.

Timber harvest and subsequent prescribed burning or mechanical fuel treatments would reduce hazardous fuels and in some cases facilitate reforestation.

Of the improvement work proposed for existing roads with this alternative (see Alternative C table below and enclosed maps), 85% is designed specifically for watershed or wildlife habitat improvement and 15% is designed primarily to facilitate safe access for timber harvest (see Appendix D for individual road information).

Watershed improvement work would be accomplished through either timber sale contracts or through other funding sources. Neither are dependent on the timber sales to accomplish this work.

Vegetation Treatments

Alternative C proposes the same vegetation treatments as those described for Alternative B (see the map packet for maps of Alternative C and Appendix D for unit by unit treatments). In a few instances, unit logging systems and harvest prescriptions were adjusted to compensate for changes in access due to the elimination of new road construction in this alternative.

Regeneration harvests: Regeneration harvests are proposed on approximately 852 acres on the Coeur d'Alene River Ranger District, approximately 3,475 acres on the Priest Lake Ranger District, and approximately 29 acres on the Newport Ranger District. Regeneration harvests would range in size from 5 to approximately 140 acres. Generally, these regeneration harvests would retain less than 30% of the trees remaining on the area.

In some cases, regeneration openings could exceed 40 acres as described above for Alternative B. Appendix D also lists which harvest units may have openings which could exceed 40 acres in size, either by themselves or because of adjacency with existing openings. Some green trees may be removed to improve survival and growth of early seral species.

Alternative C provides for planting approximately 3260 acres to long lived early seral species (ponderosa pine, white pine, or western larch) in these regeneration harvested areas (approximately 29 acres on Newport, 2,380 acres on Priest Lake, and 852 acres on the Coeur d'Alene River Ranger District. These planted stands are also more likely to provide a long term improvement in stand structure since early seral species are generally less susceptible to root disease than Douglas-fir and grand fir.

Selective harvests: Under Alternative C, entry for selective timber harvests are proposed for approximately 9,379 acres on the Coeur d'Alene River Ranger District, approximately 1,905 acres on the Priest Lake Ranger District, and approximately 1,492 acres on the Newport Ranger District. On most areas where beetle-caused mortality is light, selective harvest would remove only dead and dying trees (except for incidental trees removed for safety reasons or to create corridors for yarding logs).

Selective harvests in old growth: In the Priest Lake District, there would be approximately 300 acres of selective harvesting within infested dry-site old growth stands under this alternative (Units f10, f13, m04, m24, m33, q16, q24, q28, q36, and t26)

Aquatic Restoration

Aquatic restoration activities are proposed, and specifically target recognized risks in watersheds where beetle mortality is occurring.

Similar watershed and aquatic restoration road work is proposed under this alternative as is described above for Alternative B. As different roads are used to access some proposed harvest units in Alternative C, there are some corresponding differences in watershed road improvements proposed here (see alternative maps and Appendix D for road by road details and information on road work proposed with this alternative).

This improvement work would be done either by the purchaser of the timber sales under provisions of the timber sale contract or directly by the Forest Service through other funding sources. Some watershed restoration work would occur within Riparian Habitat Conservation Areas (e.g. obliterating roads crossing streams, installing higher standard culverts, etc.).

Fuels Treatment

As with the other alternatives, Alternative C would treat fuels created by the beetle infestation as well as logging slash in all proposed harvest units. Some fuel treatments had to be altered slightly from those proposed in Alternative B to compensate for changes in access and yarding systems for this alternative. Please see Appendix D for a list of specific fuel treatments proposed for each unit. Regeneration on the Newport District is restricted to areas where beetle mortality leaves less than 40 square feet of basal area; no live trees 21 inches diameter at breast height or larger would be cut. All numbers in these tables are approximate.

Table II-7. Activities proposed under Alternative C, by Ranger District and project area.

Vegetation Restoration approximate acres					Aquatic Restoration approximate amounts					Fuels Treatment approximate acres		
Watershed	Regen (ac.) A	Select (ac.)	Mi. Rd. Const*		Miles of Road**			# stream crossings removed or improved	fish migration miles accessed	Rx Burn	Pile	Mech.
			Temp	Perm	Rem	Rec	Rel					
Coeur d'Alene River Ranger District												
Hayden	388	2101	0	0	11	5.7	0	16/20	0.4	299	89	2106
Chain Lakes	155	1722	0	0	11	3.1	0	28/14	0.5	155	0	1722
CDA Lake	109	4760	0	0	42	7	0	75/35	1.2	213	0	4651
Bumblebee	19	87	0	0	0	1.7	0	0/2	0	19	0	87
Steamboat	0	98	0	0	4	0	0	7/3	0	0	0	98
Hart	181	611	0	0	0	0.8	0	0/5	0	181	0	611
Subtotal	852	9379	0	0	68	18.3	0	126/79	2.1	867	89	9275
Priest Lake Ranger District												
Lakeface - Granite	548	102	0	0	10.8	1.5	0	6/1	3.6	215	43	391
Lower Priest	2,927	1,804	0	0	43.9	77.5	0.8	37/49	2.0	2,814	624	1,293
Subtotal	3,475	1,906	0	0	54.7	79	0.8	43/50	5.6	3,029	667	1,684
Newport Ranger District												
Newport	29	1,492	0	0	3.9	12.4	0	0/3	0	896	0	625
Total All Districts	**4,356**	**12,777**	**0**	**0**	**126.6**	**109.7**	**0.8**	**169/132**	**7.7**	**4,792**	**756**	**11,584**

* *Temp = Temporary Road, Perm = Permanent Road. Temporary roads would be removed after use, but are not counted again in the column for miles of road to be removed.*

** *Rem = Removal (Obliterated), Rec = Reconstruction, Rel = Relocation*

Forest Plan Consistency: Alternative C is consistent with the Forest Plans.

Alternative D

This alternative was identified as the Preferred Alternative in the Draft EIS and is also the Preferred Alternative for the Final EIS.

Alternative D was developed to address the concern of not treating acres where the beetle infestation would likely spread over the next 2 years. Alternative D takes a more adaptive approach by proposing to also treat certain nearby high hazard stands if they should become infested, or if infestation levels in these stands increase during this epidemic. On the IPNF these additional high risk stands currently have few or no known current beetle-infested trees.

On the Newport district, all stands analyzed in this EIS have current beetle infestations. Those units in Appendix D with an "a" following the unit number are stands that are a lower priority to harvest either because the infestation in 1998 was fairly light or because of access or other concerns.

It is important to the understanding of this alternative to remember that no treatments would take place in these additional, high potential stands unless the beetles actually become active or more active there. Alternative D includes monitoring of beetle activity over the next two years to validate the need for entry. Similarly, the watershed restoration road work associated with access to these additional stands, and the fuels treatment within the stands, would not necessarily occur either unless the infestations spread. This results in a slightly different level of certainty associated with this work being accomplished if this alternative were selected. This varying "level of certainty" is defined and described further in Appendix D for each road proposed for improvement work.

Alternative D has been designed to begin vegetation restoration of infested areas by using timber harvest to trend forest stands towards later structural stages (i.e. larger trees), or to maintain or plant early seral conifer species such as white pine, western larch, and ponderosa pine. Some temporary and permanent road construction is proposed to access infested stands on the Coeur d'Alene River and Priest Lake Ranger Districts. These temporary roads would be obliterated after use. The new permanent roads would be barricaded after use and maintained on the road system.

Timber harvest and subsequent prescribed burning or mechanical fuel treatments would reduce hazardous fuels and in some cases facilitate reforestation.

Of the improvement work proposed for existing roads with this alternative (see Alternative D table below and enclosed maps), 84% is designed specifically for watershed or wildlife habitat improvement and 16% is designed primarily to facilitate safe access for timber harvest (see Appendix D for individual road information).

Watershed improvement work would be accomplished through either timber sale contracts or through other funding sources. Neither are dependent on the timber sales being bid up to accomplish this work.

Effects analysis for this alternative in Chapter III and summarized at the end of this chapter are based on the likely scenario of all these stands becoming infested and treated. If the total future infestation spread is less than predicted, then the resulting treatments corresponding effects would be proportionally less, and closer to those predicted for Alternative B.

Vegetation Treatments

Alternative D proposes the same types of vegetation treatments as those described for Alternative B. Using the same criteria, it also proposes similar treatments in some additional stands that are expected to become increasingly infested during the remainder of this epidemic as described above (please refer to the map packet for maps of Alternative D and Appendix D for unit by unit treatments).

Regeneration harvests: Regeneration harvests are proposed on approximately 1,176 acres on the Coeur d'Alene River Ranger District. Approximately 325 acres of this is dependent on the beetle infestation spreading.

Regeneration harvests are proposed on approximately 4,054 acres on the Priest Lake Ranger District. Approximately 580 acres of this is dependent on the beetle infestation spreading.

Regeneration harvests are proposed on approximately 162 acres on the Newport Ranger District. Approximately 133 acres of this is dependent on the beetle infestation spreading. Regeneration harvest on the Newport portion of the project would only be done in stands where the beetles have returned the stand to structural stage 1, stand initiation. These are stands where less than 40 square feet of basal area of live trees remain after the beetle infestation. No live trees 21 inches DBH or larger (except for incidental trees removed for safety reasons or to create corridors for yarding logs) would be removed on the Newport District in order to be consistent with Regional Forester's Amendments No. 1 and 2 (Pacific Northwest Region only). Similarly, there would be openings created by the beetle that would exceed 40 acres on Newport District, but approval of the regional Forester of the Pacific Northwest Region would not be required (USDA Pacific Northwest Regional Guide, and 36 CFR 219.27 (d)(2)(iii)).

Regeneration harvests would range in size from 5 to approximately 140 acres. Generally, these regeneration harvests would retain less than 30% of the trees remaining on the area.

In some cases, regeneration openings could exceed 40 acres as described above for Alternative B. Appendix D also lists which harvest units may have openings which could exceed 40 acres in size, either by themselves or because of adjacency with existing openings. Some green trees may be removed to improve survival and growth of early seral species.

Alternative D provides for planting approximately 4205 acres to long lived early seral species (ponderosa pine, white pine, or western larch) in these regeneration harvested areas (approximately 162 acres on Newport, 2,870 acres on Priest Lake, and 1176 acres on the Coeur d'Alene River Ranger District. These planted stands are also more likely to provide a long term improvement in stand structure since early seral species are generally less susceptible to root disease than Douglas-fir and grand fir.

Selective harvests: Under Alternative D, entry for selective timber harvests are proposed for approximately 3,429 acres on the Priest Lake Ranger District. Approximately 1,525 acres of this is dependent on the beetle infestation spreading. On most areas where beetle-caused mortality is light, selective harvest would remove only dead and dying trees (except for incidental trees removed for safety reasons or to create corridors for yarding logs).

Approximately 4,600 acres of selective timber harvest is proposed on the Newport Ranger District. An estimated 3100 acres of this is dependent on the beetle infestation levels increasing in these stands (all these stands on Newport have known infested trees within these high risk stands). As a guide, selective harvest treatments were recommended in stands where Douglas-fir beetle would kill less than 50% of the large trees; on Newport Ranger District, selective harvest was proposed in stands with greater than 40 square feet of live basal area remaining after Douglas-fir beetle mortality. No treatment would change stand structural stage.

Approximately 11,047 acres of selective timber harvest is proposed on the Coeur d'Alene River Ranger District. An estimated 1,665 acres of this is dependent on the beetle infestation spreading.

Selective harvests in old growth: On the Priest Lake District (as further described under Alternative B, above) there would be approximately 340 acres of selective harvesting within infested dry-site old growth stands under this alternative (Units f10, f13, m04, m24, m33, q16, q24, q28, q36, and t26 as in Alternative B plus units f13a and t15b which are dependent on whether beetle infestations spread).

Aquatic restoration

Aquatic restoration activities are proposed, and specifically target recognized risks in watersheds where beetle mortality is occurring.

The watershed and aquatic restoration road work proposed under Alternative B is also included here in Alternative D. This alternative also includes additional work not found in the other alternatives. Some of these additional improvement projects are on existing roads with identified watershed risks which would be used to access additional vegetation treatment units included in this alternative. These roads would be treated as part of the timber sale contract. Other improvement projects are located on roads not used by the timber sale purchaser and would be funded through other means.

As described above, harvesting in these additional units is dependent on the beetle infestation actually spreading or increasing in these stands. Therefore, the watershed restoration road work associated with access to these additional stands would not necessarily occur either unless the infestations spread.

This results in a slightly different level of certainty associated with this additional work being accomplished if this alternative were selected. This varying "level of certainty" is defined and described further in Appendix D for each road proposed for improvement work.

Fuels treatment

As with the other alternatives, Alternative D would treat fuels created by the beetle infestation as well as logging slash in all proposed harvest units. Alternative D has similar fuel treatments as Alternative B and includes additional acres of treatment where the additional harvest is proposed if beetle infestation spreads in the identified high hazard stands. As described above for vegetation treatments under this alternative, some of the fuels treatment is dependant on, or adaptive to whether the infestation actually spreads to these identified high infestation hazard units. Regeneration on the Newport District is restricted to areas where beetle mortality leaves less than 40 square feet of basal area; no live trees 21 inches diameter at breast height or larger would be cut. All numbers in these tables are approximate.

Please see Appendix D for a list of specific fuel treatments proposed for each unit under this alternative.

Table II-8. Activities proposed under Alternative D, by Ranger District and project area.

Vegetation Restoration approximate acres					Aquatic Restoration approximate acres					Fuels Treatment approximate acres		
Watershed	Regen (ac.) A	Select (ac.)	Mi. Rd. Const*		Miles of Road**			# stream crossings removed or improved	fish migration miles accessed	Rx Burn	Pile	Mech.
			Temp	Perm	Rem	Rec	Rel					
Coeur d'Alene River Ranger District												
Hayden	558	2,862	4.7	0	24	14.5	1	39/24	2.9	731	89	2,600
Chain Lakes	157	1,973	2.1	0.5	11	4.0	0	28/14	0.5	235	0	1,895
Coeur d'Alene Lake	178	5,498	3.3	1.9	47	6.5	0	84/39	1.2	580	0	5,096
Bumblebee	83	23	0.7	0	0	1.9	0	0/2	0	83	0	23
Steamboat	0	98	0.8	0	4	0	0	7/3	0	0	0	98
Hart	200	593	3.3	1.5	0	0.8	0	0/5	0	200	0	593
Subtotal	1,176	11,047	14.9	3.9	86	27.7	1	158/87	4.6	1,829	89	10,305
Priest Lake Ranger District												
Lakeface - Granite	694	187	0	0	10.8	1.5	0	6/1	3.6	361	43	477
Lower Priest	3,360	3,242	14.4	0	43.4	79.8	0.8	37/49	2.0	3,344	569	2,690
Subtotal	4,054	3,429	14.4	0	54.2	81.3	0.8	43/50	5.6	3,705	612	3,167
Newport Ranger District												
Newport	162	4,600	0	0	8.8	14.0	0	0/3	0	3,269	0	1,493
Total All Districts	5,392	19,076	29.3	3.9	149.0	123	1.8	201/140	10.2	8,803	701	14,965

* *Temp = Temporary Road, Perm = Permanent Road. Temporary roads would be removed after use, but are not counted again in the column for miles of road to be removed.*

** *Rem = Removal (Obliterated), Rec = Reconstruction, Rel = Relocation*

Forest Plan Consistency: Alternative D is consistent with the Forest Plans, with the following exception: Bumblebee Analysis Area on the Coeur d'Alene River Ranger District does not meet water quality standards, because there are no effective restoration actions proposed within the beetle-infested areas to offset the increased risk of installing culverts on an existing road, or a temporary spur road. It can not be adequately demonstrated that the alternative will avoid contributing to the pollutant that caused a water quality limited segment to be listed (303d).

Alternative E

Alternative E was developed to respond to public concerns that live trees may be harvested along with dead trees and also in response to public concern for harvesting within old growth stands. Except as noted below, this alternative would treat most of the same forest stands as Alternative B except that only dead and dying trees would be harvested except where otherwise necessary for safety or other reasons (i.e. skyline corridors). Additionally, this alternative drops the approximately 300 acres of selective harvest proposed in Alternative B within dry site old growth stands on the Priest Lake District.

By changing the harvest objectives to only removing the dead and dying trees, harvest prescriptions and fuel treatments were modified accordingly for Alternative E from those of the other alternatives. In some cases, where the beetle mortality would still open up enough tree canopy to allow successful growth of the desired tree species, modified regeneration harvest treatments were still proposed.

Alternative E has been designed, where the constraints allowed, to begin vegetation restoration of infested areas by using timber harvest to maintain or plant early seral conifer species such as white pine, western larch, and ponderosa pine. As in Alternative B, some temporary road construction is proposed to access infested stands. These roads would be obliterated after use.

Timber harvest and subsequent prescribed burning or mechanical fuel treatments would reduce hazardous fuels and in some cases facilitate reforestation.

Of the improvement work proposed for existing roads with this alternative (see Alternative E table below and enclosed maps), 85% is designed specifically for watershed or wildlife habitat improvement and 15% is designed primarily to facilitate safe access for timber harvest (see Appendix D for individual road information).

Watershed improvement work would be accomplished through either timber sale contracts or through other funding sources. Neither are dependant on the timber sales being bid up to accomplish this work.

Vegetation Treatments

Alternative E proposes vegetation treatments within the same infested stands as Alternative B, except for the old growth which was dropped (see the map packet for maps of Alternative E and Appendix D for unit by unit treatments). Since harvest is limited to the removal of dead and dying trees in Alternative E, selective harvest was proposed on a higher percentage of the total acres. Note that even under this alternative some green trees would have to be felled to feasibly log these stands (e.g. for safety reasons, skyline corridors to move trees out of the woods, etc.). Regardless, the intent under this alternative is to limit this as much as is feasible.

Regeneration Harvests: Regeneration harvests are proposed on approximately 2,032 acres on the Priest Lake Ranger District and approximately 29 acres on the Newport Ranger District. No regeneration harvest is proposed on the Coeur d'Alene River Ranger District. Regeneration harvests would range in size from 5 to approximately 140 acres. Generally, these regeneration harvests would retain less than 30% of the trees remaining on the area.

In some cases openings could be created that exceed 40 acres as described above for Alternatives B, C, and D. Appendix D also lists which harvest units may have openings which could exceed 40 acres in size, either by themselves or because of adjacency with existing openings.

Alternative E provides for planting approximately 1914 acres to long lived early seral species (ponderosa pine, white pine, or western larch) on approximately 29 acres on Newport, 1,505 acres on Priest Lake, and 380 acres on the Coeur d'Alene River Ranger District. These planted stands are also more likely to provide a long

term improvement in stand structure since early seral species are generally less susceptible to root disease than Douglas-fir and grand fir.

Selective harvests: Under Alternative E, entry for selective timber harvests are proposed for approximately 10,231 acres on the Coeur d'Alene River Ranger District, approximately 3,044 acres on the Priest Lake Ranger District, and approximately 1,492 acres on the Newport Ranger District.

Selective harvests in old growth: No harvesting is proposed within old growth stands in Alternative E.

Aquatic Restoration

Aquatic restoration activities are proposed, and specifically target recognized risks in watersheds where beetle mortality is occurring.

Similar watershed and aquatic restoration road work is proposed under this alternative as is described above for Alternative B (see alternative maps and Appendix D for road by road details and information on road work proposed with this alternative).

This improvement work would be done either by the purchaser of the timber sales under provisions of the timber sale contract or directly by the Forest Service through other funding sources. Some watershed restoration work would occur within Riparian Habitat Conservation Areas (e.g.obliterating roads crossing streams, installing higher standard culverts, etc.).

Fuels Treatment

As with the other alternatives, Alternative E would treat fuels created by the beetle infestation as well as logging slash in all proposed harvest units. Some fuel treatments had to be altered from those proposed in Alternative B to correspond with the change in harvest objectives (dead and dying trees only). Please see Appendix D for a list of specific fuel treatments proposed for each unit.

Regeneration on the Newport District is restricted to areas where beetle mortality leaves less than 40 square feet of basal area; no live trees 21 inches diameter at breast height or larger would be cut. All numbers in these tables are approximate.

Table II-9. Activities under Alternative E, by Ranger District and project area.

Vegetation Restoration					Aquatic Restoration					Fuels Treatment acres		
Watershed	Regen (ac.) A	Select (ac.)	Mi. Rd. Const*		Miles of Road**			# stream crossings removed or improved	fish migra-tion miles accessed	Rx Burn	Pile	Mech.
			Temp	Perm	Rem	Rec	Rel					
Coeur d'Alene River Ranger District												
Hayden	0	2,489	1.3	0	11	5.7	0	16/20	0.4	175	0	2,314
Chain Lakes	0	1,877	1.3	0	11	4.2	0	28/14	0.5	54	0	1,823
CDA Lake	0	4,869	1.7	0	42	7.0	0	75/35	1.2	20	0	4,849
Bumblebee	0	106	0.7	0	0	1.9	0	0/2	0	19	0	87
Steamboat	0	98	0.8	0	4	0	0	7/3	0	0	0	98
Hart	0	792	2.1	0	0	0.8	0	0/5	0	105	0	687
Subtotal	0	10,231	7.9	0	68	19.6	0	126/79	2.1	373	0	9,858
Priest Lake Ranger District												
Lakeface-Granite	230	419	0	0	10.8	1.5	0	6/1	3.6	214	38	398
Lower Priest	1,802	2,625	12.5	0	41.1	79.3	0.8	37/49	2.0	1,715	682	2,030
Subtotal	2,032	3,044	12.5	0	51.9	80.8	0.8	43/50	5.6	1,929	720	2,428
Newport Ranger District												
Newport	29	1,492	0	0	3.9	12.4	0	0/3	0	896	0	625
Total all districts	2,061	14,767	20.4	0	123.8	112.8	0.8	169/132	7.7	3,198	720	12,911

* *Temp = Temporary Road, Perm = Permanent Road. Temporary roads would be removed after use, but are not counted again in the column for miles of road to be removed.*

** *Rem = Removal (Obliterated), Rec = Reconstruction, Rel = Relocation*

Forest Plan Consistency: Alternative E is consistent with the Forest Plans for all resources with the following exception: Bumblebee Analysis Area on the Coeur d'Alene River Ranger District does not meet water quality standards, because there are no effective restoration actions proposed within the beetle-infested areas to offset the increased risk of installing culverts on an existing road, or a temporary spur road. It can not be adequately demonstrated that the alternative will avoid contributing to the pollutant that caused a water quality limited segment to be listed (303d).

Alternative F

Alternative F was designed in response to public comment that asked the Forest Service to concentrate work on the risks to homes and property adjacent to the National Forest. It was considered and analyzed for the Coeur d'Alene River Ranger District in the Draft EIS. For the Final EIS, Priest Lake and Newport Ranger Districts also developed and analyzed Alternative F for their project areas.

This alternative is similar to Alternatives B and D except that it focuses timber harvest, fuel treatments, and watershed improvements only on infested and high risk areas of National Forest system lands near urban areas and other private lands. Near the urban areas, additional prescribed burning and fuelbreaks are proposed in some areas of heavy fuels outside the harvest units.

Alternative F also uses the adaptive approach used by Alternative D (limited to some areas near private lands) by proposing to also treat certain nearby high risk stands and their fuels if they should become infested, or if infestation levels in these stands increase during this epidemic. As in Alternative D, no treatments would take place in these additional, high potential stands or associated roads unless the beetles actually become active or more active there. This varying "level of certainty" is defined and described further in Appendix D.

Alternative F has been designed to begin vegetation restoration of infested areas by using timber harvest to trend some forest stands towards later structural stages (i.e. larger trees), or to maintain or plant early seral conifer species such as white pine, western larch, and ponderosa pine. Some temporary road construction is proposed on the Coeur d'Alene River and Priest Lake Ranger Districts to access infested stands. These roads would be obliterated after use.

Timber harvest and subsequent prescribed burning or mechanical fuel treatments would reduce hazardous fuels and in some cases facilitate reforestation. Near urban areas additional prescribed fire outside harvest areas would be used to reduce existing fuel loads and some fuelbreaks would be constructed on the Coeur d'Alene River Ranger District, to help isolate fire risks away from private lands (see included Alternative F maps).

Of the improvement work proposed for existing roads with this alternative (see Alternative F table below and enclosed maps), 85% is designed specifically for watershed or wildlife habitat improvement and 15% is designed primarily to facilitate safe access for timber harvest and/or fire exclusion (see Appendix D for individual road information).

Watershed improvement work would be accomplished either as part of a timber sale contracts or through other funding sources. Neither are dependent on the timber sales being bid up to accomplish this work.

Vegetation Treatments

Alternative F proposes vegetation treatments similar to those described for Alternative B, except F is limited to those infestations near private lands. It also proposes similar treatments in some additional stands (as described for Alternative D above) that are expected to become increasingly infested during the remainder of this epidemic (see the map packet for maps of Alternative F and Appendix D for unit by unit treatments).

Regeneration harvests: Regeneration harvests are proposed on approximately 761 acres on the Coeur d'Alene River Ranger District.

Regeneration harvests are proposed on approximately 2,018 acres on the Priest Lake Ranger District. Approximately 160 acres of this is dependent on the beetle infestation spreading.

Regeneration harvests are proposed on approximately 133 acres on the Newport Ranger District. The entire 133 acres of this is dependent on the beetle infestation spreading.

Regeneration harvests would range in size from 5 to approximately 120 acres. Generally, these regeneration harvests would retain less than 30% of the trees remaining on the area.

In some cases, regeneration openings could exceed 40 acres as described above for Alternative B. Appendix D also lists which harvest units may have openings which could exceed 40 acres in size, either by themselves or because of adjacency with existing openings. Some green trees may be removed to improve survival and growth of early seral species.

Alternative F provides for planting approximately 2160 acres to long lived early seral species (ponderosa pine, white pine, or western larch) in these regeneration harvested areas (approximately 133 acres on Newport, 1270 acres on Priest Lake, and 761 acres on the Coeur d'Alene River Ranger District). These planted stands are also more likely to provide a long term improvement in stand structure since early seral species are generally less susceptible to root disease than Douglas-fir and grand fir.

Selective harvests: Under Alternative F, entry for selective timber harvests are proposed for approximately 1992 acres on the Priest Lake Ranger District. Approximately 505 acres of this is dependent on the beetle infestation spreading. On most areas where beetle-caused mortality is light, selective harvest would remove only dead and dying trees (except for incidental trees removed for safety reasons or to create corridors for yarding logs).

Approximately 3251 acres of selective timber harvest is proposed on the Newport Ranger District. Approximately 2082 acres of this is dependent on the beetle infestation levels increasing in these stands (all these stands on Newport have known infested trees within these high hazard stands).

Approximately 7,275 acres of selective timber harvest is proposed on the Coeur d'Alene River Ranger District.

Selective harvests old growth: On the Priest Lake District (as is further described under Alternatives B and D) there would be approximately 340 acres of selective harvesting within infested dry-site old growth stands under this alternative (Units f10, f13, m04, m24, m33, q16, q24, q28, q36, and t26 as in Alternative B plus units f13a and t15b which are dependent on whether beetle infestations spread).

Aquatic Restoration

Aquatic restoration activities are proposed, and specifically target recognized risks in watersheds where beetle mortality is occurring near urban areas and private lands. Appendix D and the enclosed maps for Alternative F display the individual treatments proposed under this alternative for each road.

Similar watershed and aquatic restoration road work described under Alternative B is also included here in Alternative F for those areas near private lands that were included in this alternative. This alternative also includes additional work found in Alternative D where the projected infestation areas were included in this alternative. These additional improvement projects are on existing roads with identified watershed risks which would be used to access some of the additional vegetation treatment units included in this alternative. These roads are proposed to be treated as part of the timber sale contract.

As described above, harvesting in these additional units is dependent on the beetle infestation actually spreading or increasing in these stands. Therefore, the watershed restoration road work associated with access to these additional stands would not necessarily occur either unless the infestations spread.

This results in a slightly different level of certainty associated with this additional work being accomplished if this alternative were selected. This varying "level of certainty" is defined and described further in Appendix D for each road proposed for improvement work.

Fuels Treatment

As with the other alternatives, Alternative F would treat fuels created by the beetle infestation as well as logging slash in all proposed harvest units. As with Alternative D, Alternative F includes some additional acres of treatment where the additional harvest is proposed if beetle infestation spreads in the identified high hazard stands. As described above for vegetative treatments under this alternative, some of the fuels treatment is dependant on, or adaptive to whether the infestation actually spreads to these identified high infestation hazard units.

Prescribed fire would be used to reduce fuels hazard and to prepare sites for regeneration as needed. Appropriated funding that is not connected to timber sale receipts may be available, and would be used to supplement the financed part of this prioritized work. Based on current funding availability, some of the fuel treatments outside proposed harvest units would likely be accomplished over a several year period of time.

Also included in this alternative are approximately 1628 acres of ecosystem improvement burning on the Coeur d'Alene River Ranger District. Some of these acres overlap selective harvest units, and the rest are outside of proposed harvest units. These burns are proposed to meet multiple resource objectives for increasing wildlife forage, reducing fuels, and reducing encroaching fir on drier sites.

In addition to the timber sale units, fuelbreaks were designed near the urban areas along ridgetops and adjacent to private ownership on the Coeur d'Alene River Ranger District. The purpose of these fuelbreaks is to provide ridgetop areas in which the fuels have been reduced and removed in strategic locations prior to any large wildfire event that may occur. The fuelbreak areas would permit more efficient, safe, and cost effective fire suppression in the event of a wildfire.

Please see Appendix D for a list of specific fuel treatments proposed for each unit under this alternative and the Alternative F maps for locations of proposed fuel breaks and other fuel reduction burning outside of proposed harvest units. All figures in this table are approximate.

Table II-10. Activities under Alternative F, by project area.

Vegetation Restoration approximate acres					Aquatic Restoration approximate amounts					Fuels Treatment approximate acres		
Watershed	Regen (ac.) A	Select (ac.)	Mi. Rd. Const*		Miles of Road**			# stream crossings removed or improved	fish migration miles accessed	Rx Burn	Pile	Mech.
			Temp	Perm	Rem	Rec	Rel					
Coeur d'Alene River Ranger District												
Hayden	388	2,101	1.3	0	11	6.6	0	16/20	0	1,860	187	1,328
Chain Lakes	155	1381	0.4	0	0	1.2	0	0/14	0	1,155	0	634
CDA Lake	74	3,265	1.7	0	29	4.6	0	56/19	0	3,277	0	551
Bumblebee	0	0	0	0	0	0	0	0/0	0	0	0	0
Steamboat	0	0	0	0	0	0	0	0/0	0	40	0	0
Hart	144	528	1.4	0	0	0.8	0	0/5	0	702	0	41
Subtotal CDA	761	7,275	4.8	0	40	13.2	0	72/58	0	7,034***	187	2,554
Priest Lake Ranger District												
Lakeface-Granite	446	125	0	0	10.8	0.1	0	6/1	3.6	156	0	415
Lower Priest	1,572	1,867	7.2	0	23.3	39.9	0.8	22/48	0	1,790	381	1,268
Subtotal Priest Lake	2,018	1,992	7.2	0	34.1	40	0.8	28/49	3.6	1,946	381	1,683
Newport Ranger District												
Newport	133	3,251	0	0	3.7	8.0	0	0/3	0	2,443	0	941
Total all districts	2,912	12,518	12.0	0	77.8	61.2	0.8	100/110	3.6	11,423***	568	5,178

* *Term = Temporary Road, Perm = Permanent Road. Temporary roads would be removed after use, but are not counted again in the column for miles of road to be removed.*

** *Rem = Removal (Obliterated), Rec = Reconstruction, Rel = Relocation*

*** *Includes wildlife/ecosystem burning acres*

Forest Plan Consistency: Alternative F is consistent with the Forest Plans.

Alternative G

Alternative G was developed in response to public comment during the review and comment period for the Draft EIS, requesting the agency to consider an alternative that completed restoration activities without the use of commercial timber harvest. The two primary activities considered in this alternative were road work for aquatic and wildlife improvements, and the use of prescribed fire and non-commercial vegetation treatments to accomplish the vegetation restoration goals.

Alternatives D and F were used as a base to select potential watershed and vegetation restoration and fuels reduction treatments proposed in this alternative. Vegetation treatments are included where prescribed fire and other non-commercial treatments could feasibly be used to treat excess fuel loadings and trend those forest stands toward desired conditions. Only those acres were included where treatments could meet these objectives. Manual thinning and pruning of submerchantable timber (less than 7 inch diameter) as well as some felling and lopping of larger timber would be required on some of these acres to meet restoration objectives.

Prescribed burning and some mechanical treatments would be used to reduce hazardous fuels, although only a limited amount of fuels created by the current beetle epidemic could be treated at this time.

All of the improvement work proposed for existing roads with this alternative (see Alternative G table below and enclosed maps) is designed specifically for watershed or wildlife habitat improvement (see Appendix D for individual road information).

Watershed improvement work would be accomplished entirely through appropriated funding sources. Based on current funding availability and trends, the activities proposed in Alternative G would likely be accomplished over a longer period of time than in the other alternatives.

Vegetation and Fuel Reduction Treatments

Alternative G proposes non-commercial vegetation treatments in some of the same forest stands as those described for Alternatives D and F (see the map packet for maps of Alternative G and Appendix D for unit by unit treatments). The same improvement and thinning prescriptions and fuels reduction objectives were used, but the treatment methods were changed to meet the intent of this alternative.

Alternative G included approximately 305 acres of prescribed spring underburning on the Coeur d'Alene River Ranger District, 365 acres on the Priest Lake Ranger District, and 2,736 acres on the Newport Ranger District. All these acres would require some manual thinning and pruning of smaller trees. Additionally, of the total underburn acres above, some felling and lopping of larger timber would be necessary on all these acres on the Priest Lake and Newport Ranger Districts

Also included in this alternative are approximately 810 acres of ecosystem improvement burning on the Coeur d'Alene River Ranger District (as in Alternative F). These burns are proposed to meet multiple resource objectives for increasing wildlife forage, reducing fuels, and reducing encroaching fir on drier sites.

Alternative G provides for planting approximately 199 acres to long lived early seral species (ponderosa pine, white pine, or western larch) in the underburn areas on the Newport District. These planted stands are also more likely to provide a long term improvement in stand structure since early seral species are generally less susceptible to root disease than Douglas-fir and grand fir.

<u>Underburning in old growth:</u> On the Priest Lake District, Alternative G includes underburning within approximately 195 acres of infested dry-site old growth stands (Units f10, m33, and q16).

Aquatic restoration

Aquatic restoration activities are proposed, and specifically target recognized risks in watersheds where beetle mortality is occurring.

Alternative G aquatic restoration includes all activities identified within Alternative D that would help restore beneficial uses in these streams. (see alternative maps and Appendix D for road by road details and information on road work proposed with this alternative).

This improvement work would be done by the Forest Service using appropriated funding sources. Some watershed restoration work would occur within Riparian Habitat Conservation Areas (e.g.. obliterating roads crossing streams, installing higher standard culverts, etc.).

Fuels Treatment

Alternative G would treat fuels within the proposed treatment areas using underburning as well as the mechanical measures (thinning, etc.) as described above. All figures in these tables are approximate.

Table II-11. Activities proposed under Alternative G, by project area.

	Aquatic Restoration approximate amounts					Fuels Treatment approximate acres		
	Miles of Road			# stream crossings removed or improved	fish migration miles accessed	prescribed burn approx. acres	manually thin/prune approx. *acres	manually fell & lop approx. *acres
	Rem	Rec	Rel					
Coeur d'Alene River Ranger District								
Hayden	26	6.6	1	47/24	4.6	776**	141	0
Chain Lake	31	1.2	0	60/14	0.5	0	0	0
Coeur d'Alene	48	4.6	0	87/39	1.2	339**	163	0
Bumblebee	3.5	0	0	7/2	0	0	0	0
Steamboat	5.8	0	0	12/3	1.2	0	0	0
Hart	7	0.8	0	12/5	0	0	0	0
Subtotal CDA	121.3	13.2	1	225/87	7.5	1,115**	304	0
Priest Lake Ranger District								
Lakeface-Granite	10.8	1.5	0	6/1	3.6	0	0	0
Lower Priest	43.4	63.8	0.8	37/48	2.0	366	366	366
Subtotal Priest Lake	54.2	65.3	0.8	43/49	5.6	366	366	366
Newport Ranger District								
Newport	8.8	12.2	0	0/3	0	2,736	2,736	2,736
Total	184.3	90.7	1.8	268/139	13.1	4,217	3,406	3,102

** The manual fuel treatment activities would be done on the same acres as the dry site prescribed fire.*
*** Includes wildlife/ecosystem burn acres*

Forest Plan Consistency: Alternative G is consistent with the Forest Plan in all resources, except for Newport, where it may not meet standards for cover:forage ratio in winter range.

Congressional Appropriation Language: Congress has included language in the last two years of Appropriations Bills as follows: "...responsible line officers see to it that prescribed burns on lands classified in the national forest land management plan as timber base will not consume commercial wood products that

could be removed in a commercially viable manner. The public should be given a chance to comment on prescribed burn plans in such situations..."

It is unlikely any burning would be done within the next two years. It is expected that some loss of commercially viable wood products would occur with this alternative.

Features Common to All Action Alternatives

These design features, as well as the following mitigation measures, are an integral part of each of the action alternatives. They are listed here separately only to avoid repeating them in each alternative description. Please note that features pertaining to commercial timber sales and associated activities, would either not be included in the activities for Alternative G or would be adapted to fit these "non-commercial" activities proposed in that alternative.

Laws, regulations, policy, or other planning documents are referenced, where applicable, in the following discussions.

General

The objective in all action alternatives is to treat forest stand and fuel conditions which result from the beetle infestation, as well as reduce the existing watershed and wildlife risks found on associated roads. The objective of this project is not to cut a certain amount of timber volume or treat specific numbers of acres or certain number of miles of roads. Acres, miles, other figures and mapped unit boundaries which are used to describe these alternatives are approximations based on the best available information. Final on-the-ground results of selecting any of the alternatives (including the "No Action" alternative) are likely to vary somewhat from what is displayed here.

Activities are designed to meet or exceed rules and regulations of the Idaho Forest Practices Act, Best Management Practices, and the Idaho Forestry Act and Fire Hazard Reduction Laws (1988), and Washington Forest Practices Rules and Regulations (1998).

Vegetation Restoration/Timber Harvest

In regeneration units, site preparation, fuel treatment and planting activities would occur within 5 years following regeneration treatment or the start of rehabilitation. Site preparation and/or fuel treatment may include a combination of prescribed burning, underburning, grapple piling and hand piling, depending on post-harvest conditions. All regeneration and rehabilitation units will be monitored for regeneration success. (National Forest Management Act requirements.)

Old Growth

For those units that are directly adjacent to old-growth stands, adjust harvest designs and subsequent treatments of border areas, as necessary to protect the integrity of the old growth (e.g. modify harvest patterns to reduce the risk of blowdown.)

Noxious Weeds

Noxious weed prevention strategies on the Coeur d'Alene River Ranger District would be conducted according to information presented in the Noxious Weeds Draft Environmental Impact Statement, IPNF, Coeur d'Alene River Ranger District (USDA 1998g). Measures to protect TES plant population viability and

habitat capability would be implemented following information presented in that document, and in Appendix C.

Noxious weed treatment on the Priest Lake Ranger District would be conducted according to guidelines established in the Priest Lake Weed Control Project FEIS (USDA 1997a). Measures to protect TES plant population viability and habitat capability would be implemented following that decision document.

Noxious weed prevention strategies on the Newport Ranger District would be conducted according to guidelines established in the Environmental Assessment for Integrated Noxious Weed Treatment for the Colville National Forest (USDA 1998f) and Region 6 Final EIS for Managing Competing and Unwanted Vegetation (USDA 1988b) as amended by the Mediated Agreement (Northwest Coalition for Alternatives to Pesticides, et al. v. Clayton Yeutter 1989)). The prevention strategy is discussed in Chapter III, Appendix C, and in the project files.

Special Designated Areas

No harvest or project-related activities would occur within designated or proposed Research Natural Area (RNA) boundaries.

Wildlife Resources

Threatened and Endangered Species Management: Consultation with the US Fish and Wildlife Service on potential effects to Threatened, Endangered and Proposed species has occurred.

Legal and biological requirements for Threatened, Endangered, and Sensitive species would be met. If any Threatened, Endangered, Proposed or Sensitive species are found during project implementation, management activities would be altered, if necessary, to ensure that proper protection measures would be taken.

Access Management

Temporary, new, bermed (blocked with earthen/debris obstruction), and impassable roads that are used to implement the Decision would remain closed to motorized use (except for administrative use) during the implementation phase of the project, including post sale activities. The Mitigation section of this Chapter contains more information on Access Management.

Heritage Resource

A goal of the Forest Service heritage resource program is to manage heritage resources to prevent loss or damage before they can be evaluated for scientific study, interpretive services or other appropriate uses. Timber harvest would be carried out in a manner which avoids adverse effects on known historic properties. Where the proposed project could have resulted in impacts to historic properties, projects have been designed from the outset so that treatment of the property would conform to sound preservation practice, and would be consistent with the relevant standards. Project design assures that the essential form and integrity of historic properties would not be impaired.

Surveys would be completed in previously unsurveyed areas prior to selling timber harvest contracts and proposed activities modified or dropped as necessary to protect any newly found heritage resources. No uninventoried sale would be sold prior to the inventory and consultation with the State Historic Preservation offices.

Watershed, Soil Productivity, and Fisheries

Best management practices are the primary mechanism to enable the achievement of water quality standards. The Forest Service Handbook 2509.22 (Soil and Water Conservation Handbook) outlines Best Management Practices (BMPs) that meet the intent of the water quality protection elements of the Idaho and Washington Forest Practices Acts. The selection and design of BMPs are an integral part of the Idaho Panhandle National Forests' Land and Resource Management Plan Standards and Guidelines for Water (Forest Plan pages II-33 and Appendix S). The BMPs applicable to IPNF portion of this project as well as information on the BMPs for the State of Idaho and the Northern Region of the Forest Service are located in Appendix F and with further discussion in these watershed sections in Chapter III.

The U.S. Forest Service, Pacific Northwest Region (R6) has developed a set of general BMPs, described in General Water Quality Best Management Practices, November 1988. This publication describes the legal background of BMPs, including the role of BMPs in meeting the Clean Water Act, and the Memorandum of Understanding between the Forest Service and Washington State Department of Ecology regarding the use of BMPs on Federal lands (1978).

The selection and design of BMPs are an integral part of the Colville National Forest's Land and Resource Management Plan Standards and Guidelines for Soil, Water and Air (Forest Plan pages 4-50-54). The BMP process is described in the Colville Forest Plan, page 4-51 item 3, and in the Colville Forest Plan Final EIS Appendix G. The full text of the Region 6 and Colville Forest BMPs is located in the analysis files. Appropriate BMPs are selected for each project by an interdisciplinary team. BMP selection and design are dictated by site specific water quality objectives, soils, topography, geology, vegetation, climate, economics, institutional constraints, etc. Many BMPs are standard timber sale contract provisions. The BMPs for the Newport District are displayed as part of the Water Quality Best Management Practices mitigation measures and found in Appendix F.

In development of the Action Alternatives, standards and guidelines of the Inland Native Fish Strategy (INFS) were used specifically to protect water and aquatic biota within the Resource Area. Riparian Habitat Conservation Areas (RHCAs) are portions of watersheds where riparian-dependent resources receive primary emphasis, and management activities are subject to specific standards and guidelines. RHCAs include traditional riparian corridors, wetlands, intermittent streams, and other areas that help maintain the integrity of aquatic ecosystems.

In lieu of on-site delineation, standard widths defining RHCA's will be used without modification. Riparian Management Objectives and road management standards and guidelines were applied on those roads used for harvesting or hauling of timber. Streamside buffer widths (RHCAs) were determined categorically for streams in the project area and are based on the Inland Native Fish Strategy. The buffer widths used would be as described in the Inland Native Fish Strategy (INFS).

Threatened and Sensitive Plants

Consultation with the US Fish and Wildlife Service for Threatened plant species has occurred. No habitat for any Threatened plant species will be affected. No populations of any Threatened plant species are documented for the analysis areas.

Surveys for Sensitive plants (Northern Regional Forester 1999 and Pacific Northwest Regional Forester 1999) would be conducted in previously unsurveyed highly suitable habitat in areas proposed for ground based harvest and/or fuels treatment or underburning prior to project implementation. Some previously surveyed areas may be resurveyed, based on the date and intensity of the most recent plant survey and the risk to habitat from proposed activities.

For the Newport Ranger District, Sensitive plant analysis was conducted prior to the signing of the new list by the Pacific Northwest Regional Forester on May 13, 1999. In accordance with direction from the Regional Forester (Williams 1999) for projects initiated but without a signed decision when the new list was finalized, analysis was conducted of species on the 1990 Sensitive plant list and on the 1997 draft Sensitive plant list. Review of the 1999 list indicated two species suspected to occur in Pend Oreille County which were not specifically addressed; however, the peatland habitat guild which could support these species was analyzed for direct, indirect and cumulative effects.

Scenery Design Criteria for Retention and Partial Retention Visual Quality Objective Areas

Where harvest units are located in a Retention or Partial Retention Visual Quality Objective area and crown closure is predicted to be less than 40% following harvest, a series of actions would be taken to meet the VQO. This would include the following:

Promote growth of western larch, western white pine, ponderosa pine, cedar, hemlock, spruce and hardwood species.

Give preference to a mosaic of vegetation for long-term diversity which maintains a landscape composed of a variety of textures and patterns. Maintain the highly-textured sky line, ridge lines and dominating patterns of swales. This can be done with clumping and feathering of unit edges to avoid introducing dominating lines, especially those next to continuous canopy on the north, northwest and northeast aspects on slopes over 40%; visually link riparian and wildlife corridors, patches, and edges by using irregularly-spaced clumping and feathering of edges, and use variable spacing with leave clumps of overstory and understory for variety in the landscape.

Roadless

The action alternatives have been designed to not impact RARE II (Roadless Area Review and Evaluation) and Forest Plan inventoried roadless areas. Moreover, the action alternatives have been designed to be consistent with the Forest Service Interim Road Rule (Feb. 11, 1999). There are no roads planned for construction or reconstruction in any of the categories of land described below:

* *All remaining roadless portions of Roadless Area Review and Evaluation II (RARE II) areas and forest plan inventoried areas that lie one-quarter mile or more beyond any classified road.*
* *A National Forest System area that is more than 1,000 acres contiguous and unroaded to a remaining roadless portion of RARE II areas or forest plan inventoried areas.*
* *National Forest System lands of 1,000 acres or more contiguous and unroaded to wild segments of the Wild and Scenic River System.*
* *National Forest System lands of 1,000 acres contiguous and unroaded to other federal roadless areas of 5,000 acres or more.*

More specific measures are detailed in the following Mitigation Measures section of Chapter II.

Forest Plan Drainage Scheduling

In the IPNF Forest Plan there were several drainages that were identified as having water quality limitations. They were classified as unscheduled and scheduled with mitigations and scheduled with limitations. These drainage scheduling recommendations were for the first decade ending 1997. The aquatic restoration activities associated with this project are designed to exceed these Forest Plan scheduling recommendations.

MITIGATION MEASURES

Mitigation measures are required as part of the Action Alternatives. Mitigation as defined in the implementing regulations for NEPA (40 CFR 1508.20) includes:

- *Avoiding the impact altogether (such as designing units to avoid heritage sites),*
- *Minimizing impacts by limiting the degree or magnitude of the action, (such as limiting the removal of dead standing snags to provide for wildlife snag habitat),*
- *Rectifying the impact by repairing, rehabilitating or restoring the affected environment (such as rehabilitating the Canfield Trail System after activities),*
- *Reducing or eliminating the impact over time by preservation and maintenance operations (such as conditioning temporary roads for overwintering if needed), and*
- *Compensating for the impact by replacing or providing substitute resources or environment (such as grizzly bear core habitat substitution).*

An estimate of effectiveness of mitigation measures is predicted by the resource specialists and interdisciplinary teams. In general, effectiveness ratings are based on literature and research, administrative studies, professional experience, results of previous monitoring on other projects, and logic.

Mitigation Measures Common to the Coeur d'Alene, Priest Lake and Newport Ranger District Project Areas

The following mitigation measures would be used as described by each of the Ranger Districts, except where noted otherwise. Other mitigation which includes items specific to individual districts is displayed after these common items. District-specific mitigation includes noxious weeds, Threatened, Endangered and Sensitive plants, access management and wildlife measures.

Timber Harvest

The timber sale contract would specify that Douglas-fir beetle infested logs cut in one season would be removed from the sale area prior to April of the following spring, or at the earliest opportunity after the first of April if the area is inaccessible prior to April.

Estimated Effectiveness: Moderate, removal of logs could be accomplished by the following year.

Recreation

Where possible, trail tread would be protected from logging activities. Disturbed tread would be restored under the timber sale contract.

Where new road construction crosses an existing system trail, approaches would be constructed and signed.

Debris would be removed from trails following harvesting and burning activities where trails have been affected by the activity.

Proposed timber harvest and fuels treatment activities would impact the Canfield Trail System, which would require rehabilitation before the area could become fully functional again. Obligations to the State of Idaho Parks and Recreation Department require full restoration of this facility.

Where possible, new road closure structures would be placed 100 feet from road junction to allow a dispersed site where the adjoining road is open to public use. Factors that would determine feasibility are: 1) providing an effective closure, 2) placing the closure where it can be seen from the open road, and 3) safety.

Major dispersed sites used for log landings would be clean of slash, returned to conditions similar to pre-logging conditions with proper water drainage and reseeded with grass following sale activities.

Snowplowing would be done in a manner that would minimize disruption of winter recreation activities. Concurrent snowplowing on Roads 206 and 437 would be avoided to allow at least one of the roads to serve as a snowmobile trail, and to ensure a snowmobile trailhead would be maintained at the Hayden Creek gauging station. Snowplowing on Road 1535 would be avoided, since snowplowing would seriously interrupt the use of Fernan Saddle for parking and as a trailhead. In addition, snowplowing would be avoided on Roads 400 and 612 to maintain the trails and trailhead parking. Winter operations within the Fourth of July cross-country ski area would be prohibited to ensure the site is available for public use. The closure period would be from approximately November 15 to March 15.

Estimated Effectiveness: Mitigation measures for snowmobile routes and snowplowing can be implemented and enforced through the timber sale contracts so estimated effectiveness is high. The mitigation for dispersed campsites and recreation is expected to be moderately effective.

Heritage Resources

In cases where a historic property is related to Native American heritage or religion, the IPNF or CNF will consult with the appropriate tribal representatives to help identify appropriate mitigation measures.

In the event that cultural resources or human remains are encountered during program activities, the Forest has the authority to modify or stop timber sale activities. The standard heritage resources protection provision C(T)6.24# (Protection Of Cultural Resources) 1/93, would be included in the sale and road construction contracts. The provision requires that the contractors and the Forest Service representatives work together to protect historic properties. Failure of the contractor to identify historic properties encountered during the harvest constitutes a breach of contract. The provision specifically requires the contractor to notify the Forest of such discoveries.

Mitigation of impacts for timber sales can include, but are not limited to:

- *Establishment of buffer zones,*
- *Directional falling,*
- *Alteration of harvest unit boundaries,*
- *Changes in road locations,*
- *Designation of skid trails away from historic properties,*
- *Limiting the harvest methods in certain areas,*
- *Seasonal limitations, and*
- *Limiting slash disposal and tree planting activities.*

Estimated Effectiveness: High. Special contract provisions are utilized in all contracts and have been effective in protecting heritage resources.

Water Quality Best Management Practices

The Environmental Protection Agency and the States of Idaho and Washington are responsible for enforcement of the Clean Water Act. The use of Best Managment Practices (BMPs), identified in the Memorandum of Understanding between the Forest Service (Designated Water Quality Management Agency for National Forest System Lands) and the States of Idaho and Washington, ensures that non-point source pollution from Forest Service management activities meets state water quality standards established under Section 319 of the Clean Water Act.

State-recognized BMPs that will be used during project design and implementation are contained in these documents:

- Rules and Regulations Pertaining to the Idaho Forest Practices Act, (IFPA), as adopted by the Idaho Land Board; and
- Rules and Regulations and Minimum Standards for Stream Channel Alterations, as adopted by the Idaho Water Resources Board under authority of the Idaho Stream Channel Protection Act (ISCPA).
- Rules and Regulations Pertaining to the Washington Forest Practices as adopted by the State of Washington

Appendix F - Best Management Practices contains BMPs, in addition to those described below, for this project. The objective of this appendix is to provide conservation practices for use on National Forest Lands to minimize the effects of management activities on soil and water resources. The conservation practices were compiled from Forest Service manuals, handbooks, contract and permit provisions, to directly or indirectly improve water quality, reduce losses in soil productivity and erosion, and abate or mitigate management effects, while meeting other resource goals and objectives.

Specific BMPs for this project, in addition to those listed in Appendix F, include the following items:

Existing roads used for haul: Stream crossing will be designed to prevent channelling of stream flows by roads. Crossings with a high risk of failure will be redesigned to pass flows without fill failure or significant erosion. Road segments intercepting and directly delivering water to streams will be designed to limit water delivery. Sustained grade road segments greater than 300 feet in length will be designed to direct flow off the road in the event of relief culvert blockage (i.e. cross drains or dips)

Landings will be designed to limit the risk of erosion, sediment delivery, and mass failure. They will be treated after use, as needed, to promote revegetation. Landings will be located such that shade and large woody debris recruitment to streams is not affected.

Temporary Roads will be designed to limit the risk of sediment delivery and mass failure. To reduce the risk of erosion or failure of temporary roads during spring runoff, all stream crossings must be able to overwinter, whether through removal of the crossing, or crossing design.

Road Closures that would prevent access for maintenance will be designed to achieve the following three objectives: 1) include self-maintaining long-term drainage off of road template, which will include installation of waterbars and removing or bypassing relief culverts, 2) reduce risk of stream crossing failures by removing pipes and fill, or establishing armored overflow channels, and 3) reduce risk of fill failure on unstable road segments by removing all "at-risk" fills.

Yarding Criteria: Following harvest or prior to end of operating season, concentrated disturbance areas will be water-barred, mulched, and seeded, as needed to reduce erosion and sediment delivery to streams. To decrease soil compaction and promote revegetation, where feasible all heavily impacted skidding routes will be ripped or scarified as needed to meet Forest Plan standards. To reduce soil impacts, tractor yarding will

be limited to slopes of 35% or less sustained grade. Winter logging over snow may occur on slopes over 35% sustained grade.

Estimated Effectiveness: Road and yarding mitigation measures would be moderate to high. Some measures would be required in the timber sale contract and effectiveness would be high.

Site-specific water quality Best Management Practices for the Coeur d'Alene River Ranger District:

The temporary road located high on the slope above the North Fork of the Coeur d'Alene River crosses through one or possibly two swales (temporary road which joins with Road #942 which accesses harvest units #8 and #82 in Brown Creek of the Hart Analysis Area). The swales probably only carry ephemeral water following intense thunder storms or rapid snowmelt. It is not likely to carry eroded materials downslope to live water or the river. However, to assure that the project in the Hart Area would not contribute to the pollutant that caused the North Fork to be listed as a Water Quality Limited Stream, the road would be located as high on the slope as necessary to avoid any stream with established bed and banks. Also, a sediment control device would be installed prior to pioneering the road location to capture materials eroded by the construction. Devices that would achieve this criteria include silt fences, slash filter windrows, and secured bales of straw or hay. The location of these devices must start at the beginning of any approach to a crossing site.

Estimated Effectiveness: High; due to the fact that this measure would avoid any streams with established bed and banks.

Soils

The following practices are designed to minimize the detrimental soil impacts of soil compaction, displacement, severe burning, nutrient and organic matter depletion on long-term soil productivity. The use of these practices will insure that the soil quality standards listed in the Forest Plan would be met. Please refer to the Project Files for a list of units requiring specific mitigation measures.

The following tractor skid trail spacing will be used:

- *On all units where feasible, existing skid trails will be used.*
- *In units with 10% or less detrimentally disturbed soils, where terrain is conducive, space trails 100 feet or more (130 feet on Newport) apart, except where converging.*
- *In units with 10 to 15% detrimentally disturbed soils, where terrain is conducive, space trails 140 feet apart, except where converging.*
- *In units with more than 15% detrimentally disturbed soils, only existing skid trails will be used.*
- *Skid trail spacing closer than listed above may be planned when winter logging on at least two feet of snow or frozen ground.*

Estimated Effectiveness: *High; because less ground would be impacted by heavy equipment operations.*

Piling slash from the skid trails or walking a grapple machine out on slash accumulations will be used to lessen potential compaction. Place and burn slash piles on the skidtrails as much as possible to minimize the total area of detrimental soil disturbance.

Estimated Effectiveness: *Moderate; because a continuous mat of slash does not always occur and soil moistures under slash piles at the time of burning are not always high enough to protect the soil organic matter from being oxidized.*

For any prescribed underburning, burning activities would take place only when the surface inch of mineral soil has a soil moisture content of 25 percent by weight or greater.

Estimated Effectiveness: Highly effective in retaining the fine soil organic component.

On sites where potassium is limited, fine residue (foliage and branches) will be allowed to overwinter on site to allow potassium to leach out of these materials.

Estimated Effectiveness: High, based on research recommendations.

Management of coarse woody debris and organic matter in cutting units will follow the research guidelines contained in Graham et. al., 1994.

Estimated Effectiveness: High, based on research recommendations.

On proposed sites that presently exceed Forest Plan standards, where feasible, deep subsoiling with a winged subsoiler will be used on all non-dedicated landings and skid trails to decrease soil compaction, promote revegetation and move these compacted sites back within Forest Plan standards.

Estimated Effectiveness: Moderate; the results vary depending on soil texture, organic matter contents, and degree of original compaction.

The following section includes mitigation measures which are specific to one or two of the Ranger Districts, as well as measures which are common to the three project areas. Please note the descriptions of where the measures would apply.

Scenery (all three districts)

Where crown closure is predicted to be less than 40% following harvest in units located in a Retention or Partial Retention Visual Quality Objective area, a series of actions may be taken to meet the VQO. The objective of those actions is to visually link riparian and wildlife corridors, patches, and edges by using irregularly-spaced clumping and feathering of edges. Use variable spacing with leave clumps of overstory and understory for variety in the landscape.

As needed to meet Visual Quality Objectives, specific mitigation measures could be to:

Reduce the visual impacts of roads by revegetating along the immediate road side, screening roads from viewpoints, and designing intersections to blend into the natural landscape. Blend earth mounds and large boulders for road closures in visually sensitive areas. Minimize the amount of clearing beyond cut and fill banks.

Where feasible, locate sky line corridors at an angle to avoid linear effects as viewed from viewpoints. Keep corridors narrow. Maintain a skyline ridge of trees with varied clumping and spacing of leave trees, locate landings outside of seen areas or leave a vegetation screen.

Protect the scenic integrity on Sensitivity Level I and II roads by avoiding construction of landings, feathering edges of prescribed burning areas, and preserving featured trees along the foreground for viewing opportunities. Vegetative screening should remain in place unless irregular openings can accomplish the same visual goal.

Mitigate negative impacts in foreground with low stumps, reduced amount of logging slash, placing tree marking paint on the back side of the tree away from the road, and leaving healthy trees. Maintain hardwoods for diversity of color and texture.

Mitigate negative impacts in the middle ground by shaping units to imitate natural openings and landform configurations, include islands of untouched vegetation. Create natural-appearing edges, minimize roads, landings and skyline corridors, locate and construct roads and landings to minimize cuts and fills, locate skyline corridors at right angles to the observer's view point. Maintain hardwoods for diversity of color and texture.

Mitigate negative impacts in the background by emulating natural forms. Created openings should be small and irregular in shape. Maintain hardwoods for diversity of color. Blend vegetation from treated to untreated areas.

The following scenery provisions would apply in the Coeur d'Alene River District Project Area:

Units 28, 35, 39, 42, 190, 193, and 200 are regeneration units in Alternative D that would probably not meet visual quality objectives. These design features were incorporated into these units to mitigate the potential effects of regeneration harvests on visual quality:

1) *Helicopter logging would be utilized in Units 35, 39, 42, 190, and 200 to provides irregular boundaries; thus avoiding straight lines and geometric unit shape.*
2) *There would only be jackpot burning rather than underburning or broadcast burning.*
3) *There would be no fireline construction.*
4) *There would be retention of green trees where possible.*

Estimated Effectiveness: Moderate. The extensive use of helicopters and limited construction of roads will generally aid in applying techniques that largely limit impacts of timber harvest on the scenic condition of the landscape. Regeneration units are more difficult to integrate into the landscape, but these mitigation measures, along with terrain influences and distance from important viewpoints are typically effective in achieving satisfactory results.

Road Construction or Reconstruction

For activities on the Newport Ranger District and the portion of the Priest Lake Ranger District which is within the state of Washington, the removal or replacement of culverts will follow the provisions of the Memorandum of Understanding between the Washington State Department of Fish and Wildlife and the Pacific Northwest Region of the Forest Service (USDA FS-R6 and Washington Dept of Fish and Wildlife, December, 1997; pp. A2, A14-A19).

Noxious Weeds

Surveys for sensitive plants would occur in highly suitable habitat prior to weed treatment.

The following noxious weeds provisions would apply in the Coeur d'Alene River and Priest Lake Ranger Districts:

Contract provisions would be used to treat identified existing infestations within the project area. Known sites and priorities for treatment were established in the Priest Lake Ranger District Noxious Weed Control

Project Environmental Impact Statement (USDA 1997) and in the Coeur d'Alene River Ranger District Noxious Weed Draft Environmental Impact Statement (USDA 1998g).

All timber sale contracts would require cleaning of off-road equipment prior to entry into the sale area.

All temporary roads, skid trails, landings or other areas of ground disturbance would be seeded with a weed-free native and desired non-native seed mix and fertilized as necessary.

All straw or hay used for mulching or watershed restoration activities will be Certified weed free.

Road segments containing infestations identified for treatment under the Priest Lake Noxious Weed EIS, and proposed for full or partial obliteration in the Douglas-fir beetle EIS will be treated prior to obliteration.

The following noxious weed provisions would apply in all areas in the Newport Ranger District:

Weed prevention would be conducted using guidelines and priorities established in the Environmental Assessment for Integrated Noxious Weed Treatment, Colville National Forest (USDA,1998). That document incorporates guidelines of the Colville National Forest Land and Resource Management Plan (Forest Plan) and the Region 6 Final EIS for Managing Competing and Unwanted Vegetation (USDA 1988b) as amended by the Mediated Agreement (Northwest Coalition for Alternatives to Pesticides, et al. v. Clayton Yeutter 1989).

Inclusion of Contract Clause CT6.343 - Noxious Weed Control, or its equivalent will be used to require cleaning of all road construction or maintenance equipment prior to entry onto National Forest lands.

All reconstructed roads, or other areas of ground disturbance associated with project-related road work, will be seeded with a weed-free native and desired non-native seed mix and fertilized as necessary as soon after the site disturbance as is practical.

Any currently barriered and non-drivable roads that are opened to use during this project will be restricted to motorized use (except for administrative use by the Forest Service and contractors).

During road reconstruction, any surfacing material (rock and gravel) will be taken from sources that are known to be free of noxious weeds.

Management actions to be undertaken within timber harvest areas include the following:

All timber sale contracts will include Contract Clause CT6.343 - Noxious Weed Control, or its equivalent will be used to require cleaning of off-road equipment prior to entry into harvest units or landings.

Seeding of log landings and skid roads will be done with higher seed densities than normally required to provide erosion control. This helps ensure establishment of desirable vegetation and has proven effective in reducing or preventing establishment of noxious weeds.

Estimated Effectiveness: Moderate, the measures listed are expected to be somewhat effective at preventing noxious weed establishment and reducing spread of noxious weeds, especially new invaders.

See Appendix C - Noxious Weeds for a complete analysis of the noxious weed prevention strategy for Newport.

Access Management

Temporary roads would be built, utilized, and obliterated in the same season, where feasible. Either Level 1 or Level 2 Obliteration would be used. The exception to immediate obliteration is on temporary roads needed for post sale activities, such as slash treatment and tree planting. These roads would be physically and effectively closed to motorized use by purchaser in the same season they were built and utilized.

In the event temporary roads intended to be closed by the timber sale purchaser are unable to be obliterated or physically closed by purchaser in the same season they were built and utilized (due to unpredictable weather conditions, etc.), they would be conditioned to overwinter and then obliterated or physically closed in the following season, as soon as ground conditions are suitable.

Access Management within Lynx Habitat

Temporary, new, bermed and impassable roads within lynx habitat areas, used to implement the Decision, would be physically and effectively closed to preclude all motorized use during non-use periods. Examples include roads that are unable to be obliterated or physically closed by purchaser in the same season they were built and utilized because of unpredictable weather conditions, and roads that would be needed for post sale activities.

Where opportunities exist, windrow right-of-way slash along entrances of temporary roads so that material can be used to effectively block roads to all motorized use.

Where winter logging occurs in lynx habitat, allow no permanent increase in travelways (plowed roads and groomed snowmobile routes) for predators.

Access Management Specific to Priest Lake and Newport Ranger Districts

Bermed or impassable roads that are opened to implement the decision would be physically and effectively blocked by purchaser in the same season they were built and utilized to control motorized access. If these roads are needed for post sale activities, the Forest Service would be required to physically and effectively block or obstruct roads in the same season they are utilized for post sale activities, to control motorized access.

Following completion of all planned activities, temporary roads would be fully obliterated (Level 2 Obliteration). Previously bermed and impassable roads would be managed with the long term intent for no motorized use (including winter snow machine use). These roads would be secured in a manner that would conceal road prisms and not create an allure for their use (e.g. front-end obliteration). Effective means to accomplish this is through one or a combination of several methods including: recontouring to original slope, placement of logs and other forest debris, planting of shrubs or trees, etc. Exceptions to this provision are roads that are part of a groomed snowmobile route system and Road 333B and Road 1094B.

Access Management Specific to Coeur d'Alene River Ranger District

Existing bermed and gated roads that are not currently brushed in and used to implement the Decision would be returned to their current status except where improvement occurs as a result of restoration activities.

All existing impassable roads used to implement the Decision would be physically and effectively secured (e.g. front end obliteration) to preclude motorized use (including winter snowmobile use).

Newly constructed system roads would be closed with earth or guardrail barriers following use for this project.

Road 1536 would be opened for project implementation. Following implementation, this road and associated spur road would be obliterated (Obliteration 1), resulting in improved elk security. Refer to the Coeur d'Alene wildlife project file that identifies road access management status.

Impassable roads within fisher habitat areas which are used to implement the Decision (Roads 1575C, 378ET, 1593UV, 1540B, 1581UW, and 1581) would be physically and effectively closed to preclude all motorized use during non-use periods (e.g. slash piles).

Estimated Effectiveness: Feature has a high probability of being implemented (e.g. contract provisions, administration of contract provision, compliance monitoring), and a high effectiveness of avoiding and reducing adverse effects on wildlife by controlling motorized access on roads.

Wildlife Resources

Timber sale contract provision CT6.251# - Protection of Endangered Species, (or equivalent) would be included in timber sale contracts.

Wildlife Tree Retention

The following minimum amounts of standing trees would be retained within harvest areas. In harvest areas less than 5 acres in size, surrounding stands of trees may be used to meet retention objectives provided that the minimum amounts of snags and green tree replacements can be met when averaged within a 25-acre zone adjacent to and surrounding the harvest area. Provide equal proportions of live trees and snags:

- *Dry Forest: 4 snags and 4 live replacements/acre from the largest trees.*
- *Moist Forest: 6 snags and 6 live replacements/acre from the largest trees.*

Selection of snags and live tree replacements would emphasize practices which assure the highest probability for long-term retention (Bull, et al. 1997). The higher hazard, higher failure probability snags (advanced decay) would not be used to meet retention objectives. Retention practices should focus on late seral ponderosa pine and western larch, and recently dead or dying Douglas-fir. Large diameter snags (greater than 15 inches diameter) that are felled for safety reasons would remain on site to provide for wildlife habitat and long-term site productivity.

Snags should be provided on every 5 acres, in clusters or patches, where feasible. It is also desirable to leave live tree replacements in the same patches.

To compensate for past losses of snags, snags and live tree replacements would be increased based on the proportion of the subdrainage without snags. This would include past regeneration harvest areas and roads (where loss of snags has occurred within 50 meters of the road).

- *In analysis areas with 25% - 50% loss of snags, retention numbers would be increased by 25%.*
- *In analysis areas with > 50% loss of snags, retention numbers would be increased by 75%.*

Pull-back slash from veteran or relic ponderosa pine live trees and snags to protect them from the adverse effects of prescribed burning.

Logs

Coarse woody debris is important to a wide variety of wildlife species. It is also essential for soil productivity, and supplies food and habitat to a large number of invertebrates and microorganisms. The

following minimum amounts of logs should be retained within harvest areas. In areas where these numbers are not attainable, provide amounts as close as possible to those listed. It is not the intent of this direction to require felling of snags or live trees to meet this requirement.

- *Dry Forest: 3-6 logs/acre; each piece 12" or greater in small-end diameter and at least 6 feet in length (20-40 total lineal feet).*
- *Moist Forest: 15-20 logs/acre; each piece 12" or greater in small-end diameter and at least 6 feet in length (100 - 140 lineal feet).*

Estimated Effectiveness for Wildlife Tree Retention and Logs measures: feature has a high probability of being implemented (e.g. contract provisions, administration of contract provision, compliance monitoring), and a moderate to high effectiveness of avoiding and reducing adverse effects on snag dependent wildlife. Project is expected to maintain a higher than the minimum number of snags because not all existing snags would be used to meet retention objectives and many of these snags would survive the activities. Also, there are large, unaffected beetle activity areas and other areas that have gone undetected. Access management features are expected to prevent significant snag losses due to firewood cutting.

Eagle Nest and Roost Site Protection

Eagle roost site searches would be conducted by the Forest Service during project layout and design. Any suspect roost sites would be reported to area Biologist for validation. Establish a ¼ mile (400m) no activity closure around discovered roost sites to maintain the visual, temporal and spatial integrity of roost sites. Closures would extend from October 15 to April 1. Silvicultural practices would be designed for the long-term availability of roost sites (evaluated on a case by case basis). Additional information can be found on marking guides for bald eagles in the various project files.

Operations and related activities would be suspended within at least one-quarter mile (approximately 400 meters) of known or discovered nest sites from February 15 - July 15 to reduce risk of nest abandonment caused by disturbance. Activity restrictions can be removed if nest site is determined to be inactive or unsuccessful.

Estimated Effectiveness: Feature would be moderately effective in detecting roost sites and highly effective in protecting known or discovered roost and nest sites.

Goshawk Nest Site Protection

Nest searches would be conducted by the Forest Service during project layout and design. Any suspect nest or other evidence of nesting (i.e. agitated bird defending territory) would be reported to area Biologist for validation.

The integrity of nest sites that lie within the treatment area would be maintained by establishing a 30-acre no-activity buffer around the nest tree, if at least 50% of the canopy closure is retained in the stand following the current beetle outbreak. This provision applies to any applicable nests found during project layout/design and implementation.

For known nest sites that lie outside treatment areas, but within a disturbance risk area, purchaser's operations and related activities would be suspended within one-quarter mile (approximately 400 meters) of known nest sites during March 15 - August 15 to reduce risk of nest abandonment caused by disturbance. Activity restrictions can be removed after June 30 if nest site is determined to be inactive or unsuccessful. This provision applies to known nest sites associated with Quartz-Jasper unit 19 and 19a, Ojibway unit 16 & 16a, and Binarch unit 20a, or any other applicable that are found during project layout/design and implementation.

A 400 acre "post fledgling area" would be provided around every known nest site. While harvest activities can occur within this area, management emphasis would focus on retaining late and old structure stands and encouraging younger stands to move toward late and old structure condition, where possible. For those units that fall within a 400 acre "post fledgling area," a regeneration harvest prescription would only be considered if the beetles have reduced the overall stand canopy below 40 percent.

Estimated Effectiveness: Feature would be moderately effective in detecting goshawk nest sites and highly effective in protecting the integrity of known or discovered nest sites.

Flammulated Owl

Habitat manipulation (i.e. timber harvesting, burning) within flammulated owl habitat would be designed to achieve conditions which would lengthen the persistence of habitat on the landscape where the effects of the Douglas-fir beetle have not adversely altered the suitability. Areas with a high probability for nesting would be surveyed for flammulated owl presence, prior to implementation. If nest trees are found, a minimum 200-foot buffer would be provided to protect the nesting integrity of the site.

Estimated Effectiveness: Feature would have a high probability of being implemented (e.g. silvicultural prescriptions, marking guides), and a high probability of avoiding or reducing adverse effects on flammulated owl habitat. Feature would be moderately effective in detecting flammulated owls, but would have a low probability in locating flammulated owl nest sites.

Townsend's Big-eared Bat

All known and discovered abandoned mines would be evaluated for their suitability to support bats. If abandoned mines are found to be suitable for bats, a 200-foot "no harvest" buffer would be provided around entrances to maintain suitability of site for bats. The Townsend's big-eared bat conservation assessment and strategy would be implemented if Townsend's big-eared bats are found.

Estimated Effectiveness: Feature would have a high probability of detecting abandoned mines and a high probability of being implemented. Feature would have a moderate to high probability of avoiding or reducing impacts on bats.

Wildlife Resource Mitigation Specific to Priest Lake Ranger District

Grizzly Bear Management

To reduce mortality risk for grizzly bears, seed mixes containing clover will not be used adjacent to open roads within the Watson and Bismark project areas. This will reduce the likelihood that bears will be foraging along open road systems and subject them to an increase in mortality risk as a result of increased exposure to humans.

All activities associated with this Decision would follow established access management guidelines for applicable Grizzly Bear Management Units.

Lakeshore Bear Management Unit: Within the Watson Project Area, timber harvest and associated activities within proposed harvest units w09, w10, w11, w16, w17, w18a, w18b, w18c, w18d, w19, w19a, and w23 would be restricted to the winter season (November 15 - March 15) to avoid additional impacts to core habitat.

To compensate for grizzly bear security and core habitat losses effectuated by activities associated with units w01, w01a, w02, w02a, w03, w04, w05, w06, w15, w22 and w22a, the following roads would be obliterated and entrances secured prior to any summer activity (March 15-November 15): Road 2249A; a portion of Road 2249 (1.5 miles from its terminus); a portion of Road 1340A; and Roads 2245A, 2245D, 2245E, 2245G, and 2245H.

Motorized use would be prohibited on the remaining portion of Road 2249 between March 15 to November 15.

Motorized use would be prohibited on the remaining portion of Roads 1340A and Roads 1340B-D during grizzly bear spring (March 15-June 30) and fall (September 11 - November 15) seasons. These seasonal restrictions would be imposed prior to implementation and would last for at least an interim period. The interim period would extent three years or until the Forest Plan is revised.

Helicopter landing sites utilized for the harvest of units w01, w01a, w02, w02a, w03, w04, w05, w06, w12, w15, w22, and w22a would be located along Road 1347 and within the general confines of the proposed timber harvest units. This measure would ensure that there are no unnecessary reductions in the amount of core and security habitat.

To avoid security or core habitat conflicts, watershed restoration work connected with Road 1340 would be completed during the summer season June 15 - July 30. All work would be compressed into the shortest time-frame possible, not to exceed one week. Entrance to Road 1340 would be secured during implementation to prevent possible disturbance from other motorized use.

Estimated Effectiveness: Feature has a high probability of being implemented (e.g. contract provisions, administration of contract provision, compliance monitoring), and a high effectiveness of avoiding and reducing adverse effects on grizzly bears.

Lynx Management

Within specific timber harvest units, a series of islands of larger-diameter trees and down wood will be retained throughout the harvested area. These areas will generally be unharvested and be approximately 1/4 to 1 acre in size. Unharvested areas would be located to facilitate movement and utilization by lynx and other wildlife species within harvested areas. Retention islands should be located no greater than 100 meters from edge of timber harvest unit or other retention islands. This criterion would pertain to timber harvest units Tola 05, 03, 03a; Flat Goose 06; Binarch 01, 01a; and Watson 06, 07, 07a, 08 and 12.

Estimated Effectiveness: Feature would be moderately effective in maintaining travel corridors for lynx with a high probability of being implemented.

Wildlife Resource Mitigation Specific to Coeur d'Alene River Ranger District

Eagle Nest Protection

Hayden analysis area; Tree harvest activities would be suspended during the nesting period (February 15 to July 15) in units 32, 35, and 37.

Coeur d'Alene Lake North analysis area: Helicopter activity would be prohibited over the east end of Fernan Lake from February 15 to July 15. No helicopter landings would be used within 2 miles of nest site during this time period.

Eagle Winter Roost Site Protection

Coeur d'Alene Lake South analysis area: For units 138 and 207, harvest activities would occur **only** between February 15 and May 15.

Helicopter use would be prohibited over Mineral Ridge, Beauty Bay and Wolf Lodge Bay between November 1 and February 15. They would be no logging activities associated with units 133 and no helicopter activities associated with units 119 and 120 during this time period.

Hayden analysis area; One of the two following conditions would be used to avoid disturbance to wintering bald eagles.

1. *Units 4, 5, 38, 39, 40, 42, 43, 44, 200 and 303 would be logged by helicopter outside the winter use period (November 1 to February 15). Helicopter landings would be located at least 1 mile distance from known nest sites, and would not fly within a mile of the nest site at the east end of the lake*

2. *If winter logging by helicopter occurs, operations would cease after 2:00 P.M.*

Estimated Effectiveness: Features would be highly effective in protecting nest and winter roost habitat, with a high probability of being implemented.

Big Game

To provide for an inactive place for wintering big game to disperse, there would be subdivisions to allow for full completion of logging activity in one area before moving to an adjacent area in winter range below 3,000 feet (Hayden 1998).

There will be subdivisions used year long to provide for wildlife security areas within the Wolf Lodge Drainage.

There would be no harvest activity within the quality hunt area beginning two weekends prior to and through the center-fire rifle season (the hunting season is determined by the Idaho Department of Fish and Game).

Under timber sale contract provisions, timber sale purchasers would not be permitted to hunt, or to transport hunters, firearms, or big game animals behind gates closed to motorized vehicles.

Estimated Effectiveness: Security features would be highly effective in being implemented and moderately effective in providing elk security areas. Features addressing mortality risk would be moderately effective in being implemented and moderately effective in reducing mortality risk.

Coeur d'Alene salamander

To protect Coeur d'Alene salamander sites (a site is a location where the species has been observed) from impacts due to vegetative treatments, a minimum protection zone of 100 feet would be maintained around known Coeur d'Alene salamander sites. At least 60% canopy cover would be retained in the protection zone over seep sites. If 60% canopy cover or less is currently present at a seep than no trees would be removed. Stream and waterfall sites would be protected with a 100 foot no-activity buffer on all sides (including both sides of the stream). No slash or prescribed brushing would occur in the protection zone, and any trees removed from the seep protection zone would be felled away from the site and understory vegetation would be retained.

To protect sites from aquatic restoration activity, ground disturbing activity would occur in November-March if possible, or in July - August. Adjacent to Coeur d'Alene salamander sites, excavated fill from culvert removals would be hauled off site or placed so that direct disturbance of the site is avoided; and existing water flow is maintained to the extent practicable. In-stream work would be conducted to avoid direct disturbance to any known sites and would not affect water flow/levels at the site. Wildlife and aquatic Forest Service personnel would work together to avoid/minimize adverse effects on known Coeur d'Alene salamander sites.

Estimated Effectiveness: This feature would be moderate to highly effective in protecting the integrity of Coeur d'Alene salamander habitat. The feature has a high potential of being implemented.

Fisher

Commercial thinning of western larch in harvest units 308, 291 and 306 would maintain at least 50 percent canopy closure.

Estimated Effectiveness: These features would be moderate to highly effective at avoiding or reducing adverse effects to fisher. They would have a high probability to be implemented.

Forest Land Birds

In large areas that are scheduled for prescribed burning, stagger implementation of burning between years to reduce the effects to ground nesting birds.

Estimated Effectiveness: Feature has a high potential of being implemented and is considered moderately effective in avoiding or reducing adverse effects to forest land birds.

Wildlife Resource Mitigation Specific to Newport Ranger District

Elk Winter Range

Retain clumps of unlogged and unburned areas to provide for cover components. The Colville Forest Plan calls for 30 to 60 acres or greater for cover units not to exceed 600 feet between units, and the Washington Department of Fish and Wildlife (WDFW) suggests 33 to 91 acres for cover units. Therefore, the following would apply:

- *Retain a total of 7 blocks 30 acres in size of unlogged and unburned areas, or not less than 5 or not more than 10, in units 25a and 26a.*
- *Retain 3 blocks 30 acres in size, in unlogged and unburned areas in unit 34a.*

Units with ground based equipment will minimize green tree mortality due to logging operations whenever possible. Desired results would be less than 10% mortality to maintain thermal cover components left after the insect mortality.

Units with planned underburning will minimize green tree mortality due to prescribed fire operations whenever possible. Prescriptions and implementation will attempt to minimize mortality to less than 10% to maintain minimum cover components left after the Douglas-fir beetle mortality, but in some cases there will be small areas of higher mortality.

Estimated Effectiveness: High; the mitigation measure can be implemented and enforced during the timber sale contract.

Lynx Habitat

Along riparian areas, ridges, and saddles maintain vegetative structure that facilitates movement of lynx.

Timber harvest unit layout would consider distance to cover in the following ways: units greater than 40 acres in size would be designed with features such as constrictions using natural features or topography to maintain crossing distance of 100 meters or less.

Denning habitat would be maintained on at least 10% of the area that is capable of producing timber stands with denning characteristics. Denning habitat should be well distributed and in patches generally greater than 5 acres in size.

In harvest units, retain islands or patches of large-diameter trees and downed wood for future denning habitat, with appropriate consideration of distance to cover and forage habitat.

Table II-12. Lynx habitat measures for Newport Ranger District.

Unit	Acres in Lynx Habitat	Number of patches to Remain
1a	57	1
15a	30	1
17a	119	2
20a	60	1
27a	40	1
41a	60	1
42a	35	1

Estimated Effectiveness: High; the mitigation measure can be implemented and enforced during the timber sale contract.

Threatened and Sensitive Plants

No harvest activity would occur in riparian habitat. Site-specific surveys would be conducted as necessary for in-stream watershed work in highly suitable riparian habitat.

No harvest activity would occur which would adversely impact any known sensitive plant population. All populations potentially adversely affected would be buffered from harvest activity by a minimum of 100 feet.

No harvest activity would occur in winter on snow within 300 feet of peatland habitat, or within 600 feet (no snow) during the rest of the year. In addition, no harvest or associated activities would occur which could alter nutrient content or hydrologic processes in peatland habitat.

The following mitigation is required to validate the Determination of Effects for Threatened and Sensitive plants in this EIS:

For Threatened plant species in the Priest Lake and Coeur d'Alene project areas only:

Previous surveys for water howellia (an aquatic species) have failed to document any occurrences of this species. Evaluation of habitat for Ute ladies'-tresses (a deciduous riparian species) indicates that actual habitat suitability for this species in the analysis areas is low. However, all aquatic and deciduous riparian habitat would be buffered from harvest activities according to Inland Native Fish Strategy (INFS) guidelines.

For Sensitive plant species in the Priest Lake and Coeur d'Alene project areas only:

All previously unsurveyed areas identified as highly suitable habitat that, as a result of the proposed activity, would have a high risk of adverse effects to Sensitive plant populations or habitat must be surveyed prior to project implementation. Some areas previously surveyed may be resurveyed, based on the date and intensity of the most recent survey and the risk to habitat from proposed activities.

All newly identified sensitive plant occurrences would be evaluated. Specific protection measures would be implemented to minimize impacts to that population occurrence and its habitat.

These protection measures could include the following:

- *Dropping proposed units from activity.*
- *Modifying the proposed activity.*
- *Implementing a minimum of 100 feet slope distance buffers around sensitive plant occurrences as necessary to minimize effects and maintain population viability.*
- *Implementing, if necessary, Timber Sale Contract provisions C(T)6.251#, Protection of Endangered Species, and C(T)9.52, Settlement for Environmental Cancellation.*
- *Implementing buffers on peatland habitats as recommended in Ecosystem Conservation Strategy for Idaho Panhandle Peatlands (Bursik and Moseley, 1995).*

Estimated Effectiveness: High, the requirement to survey, identify and protect populations from adverse effects and to buffer habitat for threatened species from all activities will be implemented prior to the award of the contract. The maintenance of any buffers protecting populations would be administered in the contract.

OPPORTUNITIES

The following are projects which could complement and improve resource conditions within the project areas. These projects are not considered mandatory to project implementation nor guaranteed to be implemented, but they may be accomplished if funding becomes available. The determination of which projects are accomplished is dependent upon available funding and priority.

Additional Watershed and Wildlife Restoration

Additional watershed/aquatic and wildlife restoration opportunities that could be accomplished if funding is available are shown in the following tables. All figures in these tables are approximate. The Coeur d'Alene River Ranger District also has opportunities for additional ecosystem burning if funding is available.

Table II-13. Miles of watershed and wildlife opportunities, by Project Area, Coeur d'Alene River Ranger District.

Watersheds	Level 1 Road Obliteration	Level 2 Road Obliteration	Trail Relocation
Coeur d'Alene	3.2 miles	---	---
Bumblebee	3.5 miles	---	---
Chain Lakes	14.7 miles	---	---
Hayden	---	2.2 miles	4 miles
Steamboat	---	1.8 miles	---
Hart	6.8 miles	---	---

Table II-14. Miles of watershed and wildlife opportunities, by Project Area, Priest Lake Ranger District.

Watersheds	Light Reconstruction	Heavy Road Reconstruction	Level 1 Road Obliteration
Lakeface-Granite	---	---	---
Binarch-Lamb	---	0.3 miles	5.5 miles
Upper West Branch	---	---	13.5 miles
Lower West Branch	0.3 miles	---	13.9 miles
Quartz	---	---	6.6 miles

Table II-15. Miles of watershed and wildlife opportunities, by Project Area, Newport Ranger District.

Watershed	Level 1 Road Obliteration
Newport Watersheds	4.5 miles

Noxious weeds

Many areas affected by the proposed activity, especially road segments and landings, will likely be surveyed and monitored to assess the establishment and spread of noxious weeds, especially new invader species. Areas in the Priest lake portion of the project will likely be treated, following the guidelines in the Priest Lake Weeds EIS. The exact extent of surveying, monitoring and treatment, and the availability of funds (KV or appropriated) is not known at this time, therefore these activities are classified as opportunities.

For the Idaho Panhandle National Forest additional existing weed infestations within the project areas could be evaluated and treated if funding becomes available. Treatments would be conducted under the guidelines established under the noxious weed prevention environmental assessment or environmental impact statement appropriate to the area.

Sensitive Plants

Additional sensitive plant monitoring could occur within priority areas.

Timber Stand Improvement

Sapling and pole-size stands have been identified within the project areas on each District where pre-commercial thinning and other work could help maintain growth, health, and desired species composition.

White pine pruning could occur to improve the opportunity for this species to resist blister rust infection and reach maturity. Select tree maintenance (maintaining superior cone-producing trees) could also occur within the Newport project area. Any pre-commercial thinning opportunities connected with the Douglas-fir beetle project would be subject to review and consultation with the U.S. Fish and Wildlife Service, in accordance with accepted standards and guidelines.

MONITORING

Introduction

The following monitoring would be conducted if any of the action alternatives are implemented. There are separate monitoring plans below for the Idaho Panhandle National Forests (Coeur d'Alene and Priest Lake Ranger Districts) and the Colville National Forest (Newport Ranger District). This monitoring is designed to verify that the projects are implemented as designed, and are effective and efficient in meeting project and Forest Plan objectives.

The National Forests have developed plans to monitor Forest Plan implementation, monitor the effectiveness of management practices implemented under the Forest Plan, and validate the assumptions and models used in planning. Forests prepare an annual Monitoring and Evaluation Report to document the results of this monitoring. For activities related to this project, all alternatives would comply with specific monitoring requirements identified by the Forest Plans for the Idaho Panhandle and Colville National Forests.

The length of time that monitoring is needed would be determined by the results and evaluation of what is being monitored. When it is certain that regulations and standards are being met, monitoring of a particular element will cease. If monitoring evaluations show that regulations or standards are not being achieved at the desired level, management intervention will occur.

Monitoring encompasses many activities and administrative processes. The monitoring identified in the monitoring and evaluation chapter of the IPNF and Colville forest plans does not include all of the monitoring done by each forest. Monitoring to address other laws, policies and site-specific decisions are part of forest-wide monitoring programs.

Forest Plan monitoring is not designed to validate our effects procedures. It is used principally to monitor changes that affect outcomes and outputs. Predicting the effects from our land management activities depends on research information. A large number of research findings were used for this project (see the List of References in the FEIS).

IPNF Forest Plan Monitoring

The 1987 IPNF Forest Plan identified twenty-two monitoring items. Because of the nature of some of the monitoring items and the diversity of forest management projects, all these items are rarely monitored on any one project. For the Douglas-fir Beetle Project the following IPNF Forest Plan items will be monitored: insect and disease hazard, visual quality objectives, wildlife, watershed and fisheries, threatened and endangered plants, soil productivity, and timber management. The methods used to monitor these are briefly summarized below.

Insects and Disease: Aerial surveys are conducted annually on the IPNF to identify locations and severity of insect problems. In addition, a forest pest conditions report is prepared. IPNF direction is to keep serious pest problems to less than five percent of the Forest.

Threatened, Endangered and Sensitive Plants: IPNF direction is to inventory and manage sensitive plants so that no new species have to be listed as threatened or endangered. Suitable sensitive plant habitat in project areas is surveyed and projects are modified to attain this objective. Sensitive plants are protected according to site-specific management plans developed by the Forest or District Botanists.

Soils: IPNF standard is to maintain 80 percent of an activity area in a productive condition for growing trees and other managed vegetation. To assist in meeting this direction, one timber sale per year on each district is monitored. Recommendations stemming from this monitoring and evaluations are made for the project being monitored and for forest wide practices in general.

Timber Management: Forest level monitoring to track implementation for the Forest-wide timber management program includes:

- *Tracking the status of regeneration on harvested lands to determine if restocking is completed within five years.*
- *Surveying to determine insect and disease levels and potential for major outbreaks.*
- *Accumulating and maintaining data on timberland suitability changes recommended by project level planning.*
- *Accumulating and maintaining data on timber sell levels (actual area and volume sold compared to Forest Plan predicted levels).*

Visual Quality: Decision documents are reviewed annually for Forest Plan visual quality objective compliance. Annually, up to two sales per district may be field reviewed after harvesting has been completed. The objective of the field review is to determine if the (Visual Quality Objectives) VQOs have been met as disclosed by the decision document for that sale. A ten percent departure from Forest Plan direction after five years would initiate further evaluation of the visual resource management program.

Wildlife: Big game management indicator species population trends are determined by using information from the Idaho Department of Fish and Game. Hunter success rates and visual counts of animals are used to determine these population levels.

Elk Habitat Potentials are monitored on Coeur d'Alene River District and by individual Elk Habitat Unit. Northern goshawk nesting sites are currently being monitored. Known nesting sites are being visually inspected to determine occupancy. The monitoring frequency varies based on funding. Surveys are conducted for additional nesting sites during project planning or implementation if nests are sighted.

Grizzly bear and caribou recovery objectives - The purpose is to monitor population changes and habitat effectiveness of grizzly bear and mountain caribou and to determine if recovery objectives are being met. Information on populations is collected from state fish and game departments and from the U.S. Fish and Wildlife Service. This information includes population estimates and mortality data. Records of habitat effectiveness as calculated through biological evaluations or assessments is maintained. The square miles of secure habitat in each bear unit is tracked annually.

Water Quality: Forest Plan Appendix JJ established the IPNF water quality monitoring program. The water quality monitoring program is the result of a Memorandum of Understanding with the State of Idaho dated September 19, 1988. The agreement also replaced Forest Plan Appendix S (Best Management Practices) with Forest Service Handbook 2509.22 (Soil and Water Conservation Practice Handbook).

According to Appendix JJ of the Forest Plan, in order to demonstrate water quality protection, monitoring plans would address three primary questions:

1. *Are BMPs implemented as designed?*
2. *Are the BMPs effective in controlling non-point sources of pollution?*
3. *Are beneficial uses of water protected?*

To provide answers to these questions, the following monitoring categories would be utilized:

Baseline monitoring characterizes existing water quality conditions and long-term trends of stream systems. It also provides a control for monitoring and assessing activities. Baseline monitoring sites throughout the Forest have been identified and established to representatively sample conditions on the Forest.

Implementation monitoring shows whether or not prescribed BMPs were implemented as designed and in accordance with Forest/Project Plan standards and guidelines. In addition to specific project monitoring discussed in this document, supplemental implementation monitoring would include internal field reviews by interdisciplinary teams using a procedure similar to State audits.

Specific projects to be monitored would be selected based on local issues and BMPs used. Projects involving each type of land management activity and a target of 10 percent of timber sales would be evaluated per year. The primary objective would be to determine if BMPs identified in the Forest/Project plan were implemented and correctly applied in a timely fashion. During the review, visual observations would be made to see if BMPs and Forest/Project plan standards and guidelines are effective.

In the event of incorrect or inappropriate application of BMPs, or omission of prescribed BMPs, causes would be identified along with corrective or preventive actions to be taken. Corrective measures would be incorporated into:

1) *modification of and adjustment to contracts;*
2) *administrative procedures; and*
3) *long-range plans as necessary to ensure BMPs are both properly designed and implemented.*

Effectiveness monitoring demonstrates if BMPs were effective in controlling pollutants to meet planned levels or resource management objectives. The intent is to focus on cause and effect relationships between land management activities and water quality. Effectiveness monitoring would be done on a sample basis to characterize typical conditions so that results can be extrapolated. Emphasis would be on major non-point pollution source contributing activities such as road construction, reconstruction, and maintenance; related erosion control BMPs; and riparian area management.

Fisheries: There were originally three fisheries monitoring items when the forest plan was adopted. Later, two of these were combined.

Greater than 80% of potential emergence success: This item was monitored during 1988 and 1989. The findings were that it was not a good monitoring tool to use to report on the health of streams. The decision was made to combine this monitoring item with the one which follows on validation of fish habitat trends.

Validate fish habitat trends: The purpose of this monitoring is to evaluate the impacts of forest management activities on fish habitat. Stream surveys are conducted at both the project and forest level. These surveys evaluate pool conditions, habitat complexity, spawning substrates, etc. Some of these surveys are only conducted once, while others have been surveyed multiple years at the same location. In addition we collect information on substrate size which can be used as a surrogate for fish habitat quality. Over 400 streams have been surveyed on the IPNF since 1988.

Fish population trends: The objective is to determine the trend in fish populations for important streams. In conjunction with the Idaho Fish and Game Department annual surveys are conducted of a subset of streams on the IPNF. The primary focus of these surveys has been westslope cutthroat and bull trout. Some of these surveys are only conducted once, while others have been surveyed multiple years at the same location.

Surveys for bull trout have focused on the Priest, Pend Oreille and St. Joe basins. Extensive surveys for cutthroat trout have been conducted in the Coeur d'Alene basin.

Project Monitoring

In addition to Forest Plan monitoring, monitoring is conducted on specific projects to ensure that implementation is consistent with the established standards and guidelines. Monitoring is also conducted to determine the effectiveness of management activities and applied mitigation measures. Specific monitoring developed for the project includes:

Insect and Disease Monitoring

During the next two to four years Douglas-fir beetle activity will be monitored and evaluated to determine the extent and intensity of infestations, as well as locations of spread or new areas of beetle-caused mortality. Monitoring will be achieved by regular aerial surveys, special surveys as needed, and ground reconnaissance.

The effects of pheromone treatments under the separate Idaho Panhandle National Forests Pheromone Study Project will be monitored as part of a broad-scale research test. This will be done by counting beetles collected in traps and by recording mortality of Douglas-fir that occurs in the test area.

Douglas-fir related monitoring is conducted cooperatively with state, research, and Forest Health Protection entomologists.

Implementation Monitoring

Project implementation generally involves the efforts of a variety of individuals with both specialized and general skills and training. Employees are accustomed to working together to achieve the desired project objectives. For example, it is common for a sale preparation forester or sale administrator to discuss specific ground or project conditions with the wildlife biologist or hydrologist to apply the best practices on the ground. Joint field reviews are taken as needed. These steady informal communications allow for incremental project adjustment throughout implementation to achieve the desired results. In addition to these less formal monitoring procedures, the following monitoring items would be conducted.

Air Quality: When burning timber harvest residues (slash), smoke management guidelines would be followed as prescribed in the Idaho Smoke Management Memorandum of Agreement (1990), the North Idaho Cooperative Smoke Management Plan (1990), and the Washington State Smoke Management Guidelines. The portion of Idaho north of the Salmon River has been divided into three airsheds. Each airshed has a coordinator responsible for reporting all planned activity to a monitoring unit. The monitoring unit regulates the prescribed burning activities of all participants in the program. The Idaho Division of Environmental Quality recognizes this process as Best Available Control Technology for prescribed burning.

Air quality is monitored by the North Idaho and Montana Airshed Groups during the Fall burning season and yearlong by the Idaho Department of Environmental Quality and the Washington Department of Natural Resources. Burning is permitted by these organizations only when air quality, atmospheric conditions and proposed prescribed burning amounts and locations would allow smoke production to be in compliance with the Clean Air Act. Burn Bosses also may restrict burning when air quality is judged poor.

Local airshed coordinators are notified annually of all planned fall burning. One day prior to burning, the coordinator is notified that burning is scheduled. Prior to ignition, the burn boss determines if burning the unit is within the smoke management guidelines before making a decision to proceed. If there is a restriction on burning, the restrictions are followed in accordance with direction from the local airshed coordinator. The Airshed Group's restriction procedures enable the Monitoring Unit to reduce burning, stop burning in

specific areas, or cease burning entirely when meteorological or existing air quality conditions so warrant. (North Idaho Cooperative Smoke Management Plan, July 1990). Restrictions on prescribed burning for local air quality reasons may be implemented in addition to those imposed by the smoke management monitoring unit.

Heritage Resources: Special contract provisions are utilized in all timber sale contracts. These provisions provide for protection of all existing recorded cultural resources. They also require that the contractor promptly notify the Forest Service upon discovery of a previously unidentified cultural resource.

Timber Management: Each active harvest unit would be visited at a frequency necessary to assure compliance with the timber sale contract. Minor contract changes or contract modifications would be enacted, when necessary, to meet objectives and standards on the ground. The timber sale areas would be examined for three years to determine if the beetle mortality is being managed to meet objectives, and whether additional projects and analysis needs to be proposed.

Water Quality: The Forest Service would monitor the implementation of applicable BMPs and mitigation measures (site specific BMPs). Monitoring would be documented in BMP inspection reports. The completed reports are given to the forest hydrologist, who forwards them to the State Bureau of Water Quality on an annual basis.

Fuels Treatment: The fuels treatment prescriptions and accomplishments are entered into the TSMRS data base; also, walk through surveys are normally conducted after the work is completed.

Effectiveness Monitoring

Timber Management: Units that are treated with a regeneration type harvest would be surveyed at one, three, and five years following planting to certify regeneration. (KV-funding assured through timber sale base rates to comply with National Forest Management Act).

Water Quality: BMP effectiveness would be monitored following at least one runoff season after BMP implementation. Watershed rehabilitation projects typically are monitored annually or biannually for effectiveness and maintenance needs. Monitoring would be correlated with watershed exams on the sale area through the 5th year after project implementation based on available funding.

Wildlife: Canopy Closure: evaluate the influences of forest management practices on forest canopy to determine if predicted levels were achieved.

Old growth: Verify applications of harvest prescriptions to determine if they are in compliance with measures to protect old-growth integrity (e.g. vegetative screens or shields) and to determine if predicted results were achieved (post treatment).

Snag Retention: A sample or portion of treatment units would be surveyed to evaluate the influences of forest management practices on wildlife tree retention practices and determine if predicted or stated objectives were achieved.

Noxious Weeds: Pretreatment of roads (C6.27) and equipment (C6.26) will be documented on sale inspection reports. The effectiveness of seeding disturbed areas will be evaluated upon completion of the activity. For the Priest Lake portion of the EIS, treated areas (especially road segments) will be surveyed and monitored following the treatment priorities established Priest Lake Weeds EIS.

Sensitive Plants: Monitoring of sensitive plant populations where the proposed activity was modified by (buffering) to avoid adverse impacts will be done to validated the effectiveness of mitigation measures both during and following the activity.

Access Management: Roads requiring closure methods to manage/control motorized use, would be monitored during the implementation phase of the project and following the project to determine the effectiveness of closure methods to control motorized access.

Monitoring items for the Newport Ranger District

The Colville National Forest has developed a plan to monitor Forest Plan Implementation, monitor the effectiveness of management practices implemented under the Forest Plan, and validate the assumptions and models used in planning. The Colville National Forest prepares a Forest Plan Monitoring and Evaluation Report on an annual basis to document the results of this monitoring.

The **Forest Plan** identified monitoring needs in Chapter 5, and the Colville National Forest Monitoring Guide describes this monitoring in more detail. This monitoring includes NEPA compliance, Best Management Practices, Water Quality, Heritage Resources, Threatened, Endangered and Sensitive Animals and Plants to name a few.

The following monitoring items are part of the monitoring needs identified in the Colville National Forest Monitoring Guide. These items are particularly pertinent to this project, and will be monitored.

Snag retention - The Forest Biologist recommends four to six snags per acre (depending on biophysical setting) be left to meet the Regional Forester's Amendment No. 2 wildlife standards. The Newport District will perform a sample survey to monitor snag levels at different phases of the project. Monitor all work including harvest and closure. The minimum standard is an average of 4-6 snags per acre in the 15 inch size class (or next largest size, if 15+ inch size does not exist) within a unit boundary area (as shown on the alternative maps).

Visual quality objectives - Visual monitoring will be done along the sensitive level I and II roads, from the dispersed campsites, and from all trails and trailheads to determine if the VQO's were met.

Soils - Field monitoring by district personnel will be performed to ensure a minimum of 80% of the activity area will be left in a non-detrimentally impacted state. The highest priority will be those areas that might exceed 20% soil disturbance because of new techniques, known or unknown equipment used. Lower priority will be given to other areas.

Insect and Disease - Annually Forest Pest Management conducts aerial surveys to identify locations and severity of insect and disease problems. These surveys are reviewed by district and forest personnel and sites visited to ascertain the extent of activity or damage. From this information, appropriate action is taken with the goal to prevent catastrophic losses. The Forest also provides an annual narrative report of Insect and Disease conditions.

Water Quality - To assure water quality meets established water quality goals Best Management Practices (BMPs) are the primary mechanism to enable the achievement of water quality standards. The Forest Service, Pacific Northwest Region (R6) has developed a set of general BMP's, described in "General Water Quality Best Management Practices, November,1988. This publication describes the legal background of BMP's, including the role of BMPs in meeting the Clean Water Act, and the Memorandum of Understanding between the Forest Service and Washington Department of Ecology regarding the use of BMPs on Federal Lands (1978). The selection and design of BMPs are integral part of the Colville National Forest's Land and

Resource Management Plan Standards and Guidelines for Soil, Water, and Air (Forest Plan, pages 4-50 to 4-54). The BMP process is described in the Forest Plan, page 4-51 item 3; and in the Forest Plan FEIS Appendix G. Many BMPs are included in the design criteria and mitigation measures. Many BMPs are standard timber sale contract provisions. The forest hydrologist and district personnel ensure use during implementation by checking project design and proposed contracts.

Implementation Plan Monitoring

Mitigation: The District Ranger will ensure mitigation measures listed in this EIS are followed.

Timber Management: The District Ranger will ensure harvest prescriptions are in compliance with direction generated in this EIS and monitor survival of planted trees and stocking levels in any created openings in compliance with NFMA and the Forest Plan.

RHCA Protection: The District Ranger will ensure that riparian resources and water quality protection measures (Inland Native Fish Strategy and Forest Plan) have been correctly prescribed and implemented.

Noxious Weeds: The District Ranger will monitor the presence and/or spread of noxious weeds along newly reconstructed roads, sale units, obliterated roads and other disturbed areas.

Vegetation condition - A sample of harvest and burn units will be reviewed 3 to 5 years post-sale to determine if the resource objectives were met, and if the desired structural stage was achieved.

Air Quality: The prescribed fire managers for the Newport Ranger District and the Priest Lake Ranger District ensure that the Washington State Smoke Management Guidelines for all prescribed burning projects located within the state of Washington are followed. Requests to burn are made the previous day through the Colville National Forest Dispatch Center to the Washington State Department of Natural Resources (WDNR) in Olympia, Washington. The DNR administers the smoke management program and approves or denies prescribed burning based on weather and atmospheric conditions. The WDNR Smoke Management Program considers proximity to Class I airsheds, non-attainment areas and weather factors that may cause an intrusion into these areas. Based on the area/unit descriptions sent to the WDNR from the districts, a determination will be made as to how many acres or which units can be burned and stay below NAAQS thresholds of PM10 products. In addition, the on-site prescribed fire manager may curtail burning, even with state approval, if conditions potentially could affect air quality.

Down Woody Material: The District Ranger will monitor 10% of the areas to ensure adequate logs were left as specified in Regional Forester's Amendment No. 2 wildlife standards.

ALTERNATIVES CONSIDERED BUT ELIMINATED

During early public scoping and project development, including the Outbreak Incident Assessment (November, 1998), several proposals were analyzed but dismissed for a variety of reasons. The following section describes the proposals and the reasons they were dismissed from further analysis.

Vegetation Restoration Only

An alternative was explored that would implement only the timber harvest activities (no watershed restoration) identified under the Proposed Action (Alternative B). Fuels reduction would occur in association with timber harvest. This alternative was eliminated from further consideration because it would not meet the Purpose and Need identified in Chapter I. Limiting activities to timber harvest would not address any of the concerns related to wildlife and fisheries habitat and watershed integrity, and for many watersheds the action would not have met Forest Plan Standards or the Clean Water Act.

Minimize Helicopter Use

Comments were received requesting that conventional harvest equipment (ground and line machines) be used to be better able to treat slash and to improve the financial return from the proposed timber sale. The proposed action (Alternative B) and Alternatives D, E, and F all included the construction and reconstruction of roads on the Coeur 'Alene River and Priest Lake Ranger Districts to facilitate the removal of beetle-infested trees. In areas where roads would result in unacceptable impacts to watershed, wildlife, and fisheries or because of unstable soil conditions, any further development of roads would not be compatible with the Forest Plan. Moreover, the construction of additional roads to allow conventional logging systems would, in some areas, extend the time frame necessary to harvest infested timber, thereby risking the loss of value in those stands, and correspondingly the ability to treat the resulting fuel loadings. The Interdisciplinary Team carefully considered the various types of logging systems in the development of each action alternative. Helicopter logging therefore was included in each action alternative only when other logging systems were not compatible with resource concerns or would not result in the timely removal of infested timber. An alternative which considered only conventional logging equipment therefore was dropped from further analysis.

No Road Closures

Several comments were received during scoping requesting that no road closures be implemented. An alternative with no road closures was considered, but dropped from further analysis. To develop the proposed action and other action alternatives, the existing road system within the project areas was analyzed (open roads, restricted roads, and closed roads) for existing and potential resource impacts. Additionally, each road was assessed for whether it was still needed to meet management needs. Where resource conflicts were caused by a road segment (e.g. failing road fill, undersized culvert, road fill encroaching or in stream channels), the full range of potential fixes were explored. Open roads were only considered for obliteration where, either they weren't expected to be needed to meet management needs in the near future, or it was the only viable means to correct the problem with the road. The vast majority of roads that are prescribed for obliteration in the proposal are already closed or restricted. Of the remaining, most are short dead-end spurs accessing small acreages and often have alternate access. The remaining few existing open roads which would be dismantled would be those causing adverse impacts to watershed, fisheries, or wildlife resources that could not be mitigated in any other way. Because of the resource risks from these roads, an alternative which doesn't include any road closures or obliterations would not meet the purpose and need of improving fisheries and wildlife habitat or watershed integrity.

Beetle Infestation Suppression

Based on letters received during scoping, an alternative was considered that would take the actions necessary to suppress the Douglas-fir beetle infestation in the identified analysis areas. Suppression options such as the use of trap-trees, pheromone-baited funnel traps, and anti-aggregant pheromones in addition to harvest would be included in this alternative. Although the use of pheromones may not stop the outbreak, they could be used in certain areas to direct where mortality occurs, which would then be treated. This alternative was eliminated from further consideration for activities occurring in 1999 because the decision on the environmental impact statement could not be made prior to the optimum time frame for field application.

Spraying of insecticide to reduce populations also was suggested by various commenters. That technique is not effective or feasible on Douglas-fir beetle as most of their life cycle occurs under the bark of trees. The greatest benefits in dealing with actual or potential Douglas-fir beetle infestations are derived from efforts aimed at preventing outbreaks (by managing for more resilient forest conditions) rather than suppressing them (Outbreak Incident Report, 1998). NEPA timing requirements preclude the use of tree removal as a method for reducing beetle populations.

Treating all areas with current and potential Douglas-fir beetle infestation

The "Outbreak Incident Assessment Team" looked at the magnitude of the beetle infestation during the late fall of 1998 and projected future behavior and potential spread of the insects. That team predicted the IPNF has roughly 250,000 acres considered moderate to high hazard to be infested by Douglas-fir beetles. Included in these acres are numerous riparian zones. While prevention is one of the best tools to use for the beetle, harvesting on all moderate and high hazard acres at one time would cause unacceptable impacts to other resources such as wildlife, fisheries, and watershed. Harvesting in riparian zones is allowed under INFS guidelines, but requires specific watershed analysis for each stream. The time necessary to complete that level of analysis would cause too much delay for this project.

Treating moist site old growth

Interdisciplinary teams considered whether to harvest beetle infested trees within these moist site old growth stands. It was determined that these stands would retain the desired old growth characteristics through the beetle infestation, so these stands were dropped from further consideration.

Fire restoration alternative

Comments received after the Draft EIS asked the agency to consider an alternative that treated excess fuel loadings and vegetation conditions with prescribed fire, but without commercial timber harvest. Alternative D harvest schedule was used as a base to determine potential fire treatments. After a preliminary look at the alternative, it was dismissed for the following reasons: increased risk of additional beetle infestation following the prescribed fire; it would not meet the watershed restoration portion of the purpose and need; there would be a high risk of escaped fire ; in some areas the fire could burn too hot and volatilize nutrients; it would not meet visual quality objectives in Hayden face, Coeur d'Alene face and Chain Lakes areas.

A subset of this alternative that could meet resource objectives was included in Alternative G.

Alternative G with no mechanical pre-work

Comment received after the Draft EIS requested an alternative that uses no commercial timber sales, builds no new roads, uses no mechanical thinning or pruning work prior to introduction of prescribed fire; in other words use fire, then let nature run its course and find its own balance. This alternative is similar to the fire restoration alternative described above, and was dismissed for the same reason. A subset was analyzed in Alternative G.

Combination of Alternative C and Alternative E

Comment received after the draft requested an alternative be analyzed that combined timber harvest prioritized in the urban interface with no new road construction. Any number of combinations could be taken through the analysis phase of the EIS, making it a very cumbersome document. In this case, the decision-maker has the option to chose Alternative E and not build any new roads. This choice could be made in the Record of Decision and does not necessarily require tracking through the EIS.

COMPARISON OF ALTERNATIVES

This section compares the alternatives for each Ranger District. This is a summary; for more detail, please see Chapter III of the FEIS under each resource section.

The following table presents the key features of all alternatives for each of the three Ranger Districts. Additional tables in this chapter display more detail for each alternative. All numbers in this table are approximate.

Table II-16. Proposed Activities, by Alternative, Coeur d'Alene River Ranger District.

Vegetation Restoration					Aquatic Restoration					Fuels Treatment acres		
ALT.	Regen (ac.) A	Select (ac.)	Mi. Rd. Const*		Miles of Road**			# stream crossings removed/ improved	fish migration miles accessed	Rx Burn	Pile	Mech.
			Temp	Perm	Rem	Rec	Rel					
Alt A	0	0	0	0	0	0	0	0/0	0	0	0	0
Alt B	852	9,379	7.8	0	68	19.6	0	126/79	2.1	867	89	9,275
Alt C	852	9,379	0	0	68	18.3	0	126/79	2.1	867	89	9,275
Alt D	1,176	11,047	14.9	3.9	86	27.7	1	158/87	4.6	1,851	89	10,303
Alt E	0	10,231	7.9	0	68	19.6	0	126/79	2.1	373	0	9,858
Alt F	761	7,275	4.8	0	40	13.2	0	72/58	0	7,034****	187	2,554
Alt G	0	0	0	0	121.3	13.2	1	225/87	7.5	1,115****	0	0

**Temp = Temporary Road, Perm = Permanent Road Temporary Roads would be removed after use, but are not counted again in the column for miles of road to be removed*

*** Rem = Removal (Obliterated), Rec = Reconstruction, Rel = Relocation*

**** includes manually thin and prune, and manually fell and lop.*

***** Includes wildlife ecosystem burning acres.*

Table II-17. Proposed Activities, by Alternative, Priest Lake Ranger District.

Vegetation Restoration					Aquatic Restoration					Fuels Treatment acres		
ALT.	Regen (ac.) A	Select (ac.)	Mi. Rd. Const*		Miles of Road**			# stream crossings removed/ improved	fish migration miles accessed	Rx Burn	Pile	Mech.
			Temp	Perm	Rem	Rec	Rel					
Alt A	0	0	0	0	0	0	0	0/0	0	0	0	0
Alt B	3,475	1,906	13.0	0	53.0	80.8	0.8	43/50	5.6	3,090	667	1,623
Alt C	3,475	1,906	0	0	54.7	79	0.8	43/50	5.6	3,029	667	1,684
Alt D	4,054	3,429	14.4	0	54.2	81.3	0.8	43/50	5.6	3,705	612	3,167
Alt E	2,032	3,044	12.5	0	51.9	80.8	0.8	43/50	5.6	1,929	720	2,428
Alt F	2,018	1,992	7.2	0	34.1	40	0.8	28/49	3.6	1,946	381	1,683
Alt G	0	0	0	0	54.2	65.3	0.8	43/49	5.6	366***	0	0

**Temp = Temporary Road, Perm = Permanent Road Temporary Roads would be removed after use, but are not counted again in the column for miles of road to be removed*

*** Rem = Removal (Obliterated), Rec = Reconstruction, Rel = Relocation*

**** includes manually thin and prune, and manually fell and lop.*

Table II-18. Proposed Activities, by Alternative, Newport Ranger District.

Vegetation Restoration					Aquatic Restoration					Fuels Treatment acres		
ALT.	Regen (ac.) A	Select (ac.)	Mi. Rd. Const*		Miles of Road**			# stream crossings removed/ improved	fish migration miles accessed	Rx Burn	Pile	Mech.
			Temp	Perm	Rem	Rec	Rel					
Alt A	0	0	0	0	0	0	0	0	0	0	0	0
Alt B	29	1,492	0	0	3.9	12.4	0	0/3	0	896	0	625
Alt C	29	1,492	0	0	3.9	12.4	0	0/3	0	896	0	625
Alt D	162	4,600	0	0	8.8	14.0	0	0/3	0	3,269	0	1,493
Alt E	29	1,492	0	0	3.9	12.4	0	0/3	0	896	0	625
Alt F	133	3,251	0	0	3.7	8.0	0	0/3	0	2,443	0	941
Alt G	199	0	0	0	8.8	12.2	0	0/3	0	2,736***	0	0

**Temp = Temporary Road, Perm = Permanent Road Temporary Roads would be removed after use, but are not counted again in the column for miles of road to be removed*

*** Rem = Removal (Obliterated), Rec = Reconstruction, Rel = Relocation*

**** includes manually thin and prune, and manually fell and lop.*

Key Issue Level of Timber Harvest

As noted throughout this document, the mortality of large Douglas-fir trees from the beetle infestation is affecting thousands of acres across the Idaho Panhandle and the Colville National Forests. The amount of timber harvest to be conducted is one of the key issues. The measurement of change includes the level of harvest, which has been divided into four categories to more closely track the comments received on this issue. Those categories are as follows:

- *Level of harvest in stands currently infested by Douglas-fir beetle,*
- *Total acres of treatment in stands potentially infested by Douglas-fir beetle,*
- *Total acres of treatment removing dead and beetle-infested trees only,*
- *Total acres of treatment removing some additional green trees.*

The table below provides a comparison for the three Ranger Districts and the seven alternatives.

Table II-19. Level of harvest in beetle-infested areas: Approximate acres of treatment in stands currently infested.

District	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Coeur d'Alene	0	10,231	10,231	10,231	10,231	8,036	—
Priest	0	5,380	5,380	5,380	5,077	3,346	0
Newport*	0	1521	1,521	4,763	1,521	3,384	0
Total	**0**	**17,132**	**17,132**	**20,374**	**16,829**	**14,766**	**0**

** All units on Newport have Douglas-fir beetle infestations.*

Table II-20. Level of harvest in beetle-infested areas: Approximate acres of treatment in stands with high potential for infestation spread, if spread occurs.

District	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Coeur d'Alene	0	0	0	1,992	0	0	0
Priest	0	0	0	2,103	0	664	0
Newport*	0	0	0	0	0	2,135	0
Total	**0**	**0**	**0**	**4,095**	**0**	**2,799**	**0**

** All units on Newport have Douglas-fir beetle infestations.*

Table II-21. Level of harvest in beetle-infested areas: Approximate acres of treatment proposed for removing only dead and beetle-infested trees.

District	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Coeur d'Alene	0	9,379	9,379	9,886	10,231	7,275	0
Priest	0	1,146	1,146	2,623	5,077	1,199	0
Newport	0	1,250	1,250	4,243	1,521	3,125	0
Total	**0**	**11,775**	**11,775**	**16,752**	**16,829**	**11,599**	**0**

Table II-22. Level of harvest in beetle-infested areas: Approximate acres of treatment removing some green trees in addition to dead and infested trees.

District	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Coeur d'Alene	0	852	852	2,377	0	761	0
Priest	0	4,235	4,235	4,860	0	2,811	0
Newport	0	271	271	519	0	259	0
Total	**0**	**5,358**	**5,358**	**7,756**	**0**	**3,831**	**0**

Summary Of Species Composition Changes

Each action alternative moves the components of the landscape on a trend. (The structural stages under all alternatives remain the same except Alternative G on Newport Ranger District. For stand structure changes, mortality from beetle infestation is no different than regeneration harvesting.) Under all alternatives on the Coeur d'Alene and Priest Lake Project Areas, stands in which ponderosa pine or western larch are an important component, there will be an improvement in stand conditions over the short term as competition between Douglas-fir and these species is reduced due to mortality of the Douglas-fir. For Alternatives A and G on the Coeur d'Alene and Priest Lake Districts and Alternative A on the Newport Districts, no long term increase in desired forest cover types would take place. There will be a continued trending away from the desired conditions of more long-lived seral species.

On the Coeur d'Alene and Priest Lake Districts, Alternatives B through F the forest cover types trend in the desired direction toward an increase in more long-lived seral species. For Alternatives B, C, D, E, F, and G, the forest cover types trend in the desired direction away from the Douglas-fir cover type on the Newport District but the increase in western larch, white pine and ponderosa pine cover types is very small due to the small amount of regeneration harvesting that is proposed.

Table II-23. Forest Cover Type acres and percent gain of desired species restoration, by alternative, by Ranger District.

Ranger District	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Coeur d'Alene	*0 acres *0 %	852 acres +.6%	852 acres +.6%	1176 acres +.8%	373 acres +.25%	761 acres +.5%	*0 *0
Priest Lake	1,258 acres + 1.0%	3,695 acres + 3.0%	3,695 acres + 3.0%	4,252 acres + + 3.5%	2,431 acres +1.9%	2,530 acres +2.1%	*1,258 ac +1.0%
Newport	29 acres 0.1%	29 acres 0.1%	29acres 0.1%	162 acres 0.5%	29 acres 0.1%	133 acres 0.4%	199* 0.6%*

*For the Priest Lake and Newport Project Areas there is expected to be some increase in growing space for existing ponderosa pine and western larch due to the mortality in Douglas-fir on these acres. A short term forest cover type change will result until reestablishment of Douglas-fir or grand fir. For the Coeur d'Alene Project Area, no cover type changes are expected to result in a ponderosa pine or western larch cover type under Alternatives A and G, resultant changes are expected to trend to grand fir. For the Newport project area in alternative G, some stands of Douglas fir will be open enough to allow planting and establishment of desired seral species resulting in a cover type change to these units.

Over the Cumulative Project Area which included the Newport, Priest lake, and Coeur d'Alene project areas, There would be a little over a 1% change toward desired species composition in the maximum action alternative.

Issue: Changes in structure or size classes
Measurement of Change: Percentage change in size class, by project area.

On the Coeur d'Alene River and Priest Lake Ranger Districts, the Action Alternatives would not change the size class (forest structure) beyond that which will occur as a result of the Douglas-fir beetle infestation. Therefore, there would not be any difference between Alternative A (the result of the beetle infestation) and the other alternatives.

Table II-24. Changes in size classes by percent of project area (National Forest System lands), Coeur d'Alene River Ranger District.

Size Class	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
shrub/seed/sap	+ 1.4%	+ 1.4%	+ 1.4%	+ 1.4%	+ 1.4%	+ 1.4%	+ 1.4%
poles/small-medium sawtimber	- 0.5%	- 0.5%	- 0.5%	- 0.5%	- 0.5%	- 0.5%	- 0.5%
mature-large sawtimber	- 0.8%	- 0.8%	- 0.8%	- 0.8%	- 0.8%	- 0.8%	- 0.8%
old forest	- 0.1%	- 0.1%	- 0.1%	- 0.1%	- 0.1%	- 0.1%	- 0.1%
old growth (allocated)	0	0	0	0	0	0	0

Table II-25. Changes in size classes by percent of project area (National Forest System lands), Priest Lake Ranger District.

Size Class	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
shrub/seed/sap	+ 4%	+ 4%	+ 4%	+ 4%	+ 4%	+ 4%	+ 4%
poles/small-medium sawtimber	0	0	0	0	0	0	0
mature-large sawtimber	- 4%	-4%	-4%	-4%	-4%	-4%	-4%
old forest	0	0	0	0	0	0	0
old growth (allocated)	0	0	0	0	0	0	0

On the Newport Ranger District, only Alternative G would change structural changes beyond that which will occur as a result of the beetle-infestation (displayed in Alternative A).

Table II-26. Changes in size classes by percent of project area (National Forest System lands), Newport Ranger District.

Structural Stage	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Stage 1-3 (early)	+ 0.4%	0	0	0	0	0	+ 0.3%
Stage 4-5 (middle)	0	0	0	0	0	0	- 0.3%
Stage 6 (late/old multi-story)	- 0.4%	0	0	0	0	0	0
Stage 7 (late/old single story)	0	0	0	0	0	0	0

Key Issue Watershed and Fisheries

In Table II-2 earlier in this chapter, the issues and measurements of change associated with watersheds and aquatic habitat define and describe *subwatershed* (in the general range of 20,000 to 100,000 acres) and *tributary* (1,000 to 10,000) scale responses and effects. Watershed systems tend to integrate water resource responses (water quality, runoff, stream condition) very well with respect to project management activities. However, some of those response parameters become unresponsive to cumulative effects evaluations at very large scales where multiple and highly diverse watersheds are combined into basin-scale areas.

Each of the three main project areas assessed were analyzed for at least two scales: the local site or tributaries where activities take place; and the larger watershed. The cumulative effect watershed (or watershed area) is the logical culmination point of water flow where the effects of the distributed project activities could possibly integrate or synchronize over time and space and be addressed cumulatively in a larger watershed.

Often the physical effects of runoff modifications, sediment loading, and water temperature, if they occur in projects of this scale, are technically immeasurable and/or not observable at larger watershed and subbasin scales due to desynchronization (individual tributaries respond at different times of the year, some are slower to respond than others to disturbance events); the inherent large range of variability that watershed processes operate within and under which these drainages have evolved; and due to the fact that watershed systems are inherently dynamic.

Therefore, for purposes of effectively summarizing the differences between the watershed elements of the project for the entire project, or for each of its three general project areas, four key measurements are the most useful. The finer scale assessments and comparisons can be found in the Watershed sections in Chapter III.

The following measures are compared by alternative in the tables below.

Net Stream Crossings. The net change in the number of inventoried stream crossings in the project area compared to the existing (present) conditions. New road construction or reconstruction of roads without culverts can add to the net value. Road or crossing obliteration or conversion to fords would reduce it.

This parameter is a factor in the total risk or risk reduction that an alternative provides to the project. Crossings reflect potential risk of introduction of sediment into a stream course, potential hydraulic modification of a stream, local storm flow augmentation, and fish migration barriers. By itself, net stream crossings are an indicator that must be further qualified to estimate effects. The parameter is a derivative of the "crossing density" for a watershed (the number of crossings per square mile of watershed area).

Net Associated Risk. The risk of annual sediment production was calculated in the analyses at inventoried road crossings. Crossings that would be upgraded, fitted for safe overflow, or crossings that are eliminated would reduce net risk based on the chance of failure and the magnitude of failure. This is a primary evaluation factor for determining watershed improvement potential within the scope of this project.

Net Roads. The relative miles of road following implementation of each alternative as compared to present (existing condition). The net value can increase with new construction of permanent or temporary road. The value can decrease with the stabilization of road tread to a "hydrologically inert" status.

The parameter is a derivative of the "road density" for a watershed (the miles of road per square mile of watershed area). Net roads is an indicator of changes of watershed risks that are associated with erosion sources, fill failures, episodic stream blockages, and peak flow augmentations. By itself, net road miles are an indicator that must be further qualified to estimate effects.

Net Encroaching Road. Certain roads that are encroaching on stream channels or their active flood prone areas were inventoried. Such roads are a source of sediment, cause adverse hydraulic effects in the stream, and inhibit channel recovery from disturbances. The net value would decrease when a road segment is eliminated or rendered hydraulically inert.

This is a primary evaluation factor for determining watershed improvement potential within the scope of this project. Encroaching roads can potentially be related to large scale sediment sources, crossing failures, disruption to riparian functions, and direct inhibitors to the stream systems' ability to adjust effectively to disturbances generated by the road and by the watershed.

Subbasin-Scale Comparisons

Table II-27. Subbasin-wide comparison for the Coeur d'Alene River District Project Area.

Watershed Name: Coeur d'Alene Analysis Area	HUC: 170103 -01 -03 -04 & -05

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Net stream crossings (#)	-140	-236	-250	-255	-236	-200	-365
Net associated risk (tons/year)	-426	-1,251	-1,267	-1,343	-1,151	-926	-1,650
Net roads (miles)	-75	-135	-142	-142	-135	-110	-196
Net encroaching road (miles)	-0.3	-4.7	-4.7	-5.2	-4.7	-3	-8.9

All of the alternatives, including No Action (A), indicate substantial overall watershed improvements distributed widely over the Coeur d'Alene Lake and River subbasins. Substantial watershed improvements are ongoing or are reasonably foreseeable, even without any of the action alternatives of this project. However, all the action alternatives indicate accelerated improvement activities. Actual watershed restoration would be realized at the smaller watershed and tributary scales.

Alternative G would result in the greatest net reduction of erosion and sediment sources and risks of riparian and instream damages that are present in the existing conditions; and since there is only a minimal amount of new or compounded disturbances being introduced by logging or other vegetative management activities that exceed those being induced by the beetle infestations.

The action Alternatives B, C, D, and E would result in the similar reductions of erosion and sediment sources and risks of riparian and instream damages that are present in the existing conditions; but they are limited somewhat by the amount of new or compounded disturbances being introduced by logging or other vegetative management activities that exceed those being induced by the beetle infestations. Subbasin wide, the net effects would be substantial local water resource improvements that would be most evident in several tributary areas. The improvements however are dominant in individual watersheds. Some watersheds would simply have no net effects in terms of risk to water resources (see watershed effects in Chapter III).

Action Alternative F and the No Action Alternative A (because of reasonably foreseeable actions that are already scheduled or committed to) would result in some reductions of erosion and sediment sources and risks of riparian and instream damages that are present in the existing conditions; but they are limited somewhat by the amount of new or compounded disturbances being introduced by logging or other vegetative management activities that exceed those being induced by the beetle infestations. Subbasin, the net effects would be substantial local water resource improvements that would be most evident in tributary areas. The improvements however are dominant in individual watersheds. Some watersheds would simply have no net effects in terms of risk to water resources (see watershed effects in Chapter III).

Table II-28. Subbasin-wide comparison for the Priest Lake Ranger District Project Area.

Watershed Name: Priest River	HUC: 17010215

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Net stream crossings (#)	-9	-52	-52	-52	-52	-37	-52
Net associated risk (tons/year)	-29.3	-60.5	-60.5	-60.5	-59.5	-59.1	-60.5
Net roads (miles)	-3.8	-56.8	-58.5	-58.0	-55.6	-37.9	-58.0
Net encroaching road (miles)	-0.1	-1.9	-1.9	-1.9	-1.9	-1.3	-1.9

All the alternatives, including alternative A, indicate substantial overall watershed improvements distributed widely over the Priest River subbasin. Substantial watershed improvements are ongoing or are reasonably foreseeable, even without any of the action alternatives of this project. However, all the action alternatives indicate accelerated improvement activities. Actual watershed restoration would be realized at the smaller watershed and tributary scales.

Alternative G would result in the greatest overall net imprvements to watersheds. It would result in similar reductions of erosion and sediment sources and risks of riparian and instream damages as ALternatives B, C, and D; but only introduces minimal amounts of new or compounded disturbance from vegetative management activities.

All the action alternatives would result in the similar reductions of erosion and sediment sources and risks of riparian and instream damages that are present in the existing conditions; but they are limited somewhat by the amount of new or compounded disturbances being introduced by logging or other vegetative management activities that exceed those being induced by the beetle infestations. Subbasin wide, the net effects would be substantial local water resource improvements that would be most evident in tributary areas. The improvements however are dominant in individual watersheds. Some watersheds would simply have no net effects in terms of risk to water resources (see watershed effects in Chapter III).

The No Action alternative A (because of reasonably foreseeable actions that are already scheduled or committed to) would result in some reductions of erosion and sediment sources and risks of riparian and instream damages that are present in the existing conditions; but they are limited somewhat by the amount of new or compounded disturbances being introduced by logging or other vegetative management activities that exceed those being induced by the beetle infestations. Subbasin wide, the net effects would be substantial local water resource improvements that would be most evident in tributary areas. The improvements however are dominant in individual watersheds. Some watersheds would simply have no net effects in terms of risk to water resources (see watershed effects in Chapter III).

Table II-29. Subbasin-wide comparison for the Newport Ranger District.

Watershed Name: Newport - Pend Orielle Analysis Area	HUC: 17010216

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Net stream crossings (#)	0	-3	-3	-13	-3	-4	-13
Net associated risk (tons/year)	0	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
Net roads (miles)	1.6	-2.3	-2.3	-7.2	-2.3	-2.1	-7.2
Net encroaching road (miles)	0	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4

All the action alternatives indicate at least some overall watershed improvements distributed widely over the Newport area in the lower Pend Oreille subbasin. The no action alternative A gives no indication of any proactive watershed restoration at this scale. However, all the action alternatives indicate the presence of

some improvement activities. Actual watershed restoration would be realized at the smaller watershed and tributary scales.

Alternative G would result in the greatest reduction of erosion and sediment sources and risks of riparian and instream damages that are present in the existing conditions; and since there is only a minimal amount of new or compounded disturbances being introduced by logging or other vegetative management activities that exceed those being induced by the beetle infestations.

Alternative D would result in similar reductions of erosion and sediment sources and risks of riparian and instream damages that are present in the existing conditions; but they are limited somewhat by the amount of new or compounded disturbances being introduced by logging or other vegetative management activities that exceed those being induced by the beetle infestations. Subbasin wide, the net effects would be frequent local water resource improvements that would be most evident in tributary areas. The improvements however are dominant in individual watersheds. Some watersheds would simply have no net effects in terms of risk to water resources (see watershed effects in Chapter III).

The action alternatives B, C, and E would result in the similar reductions of erosion and sediment sources and risks of riparian and instream damages that are present in the existing conditions; but they are limited somewhat by the amount of new or compounded disturbances being introduced by logging or other vegetative management activities that exceed those being induced by the beetle infestations. Subbasin wide, the net effects would be limited local water resource improvements that would be most evident in tributary areas. The improvements however are dominant in individual watersheds. Some watersheds would simply have no net effects in terms of risk to water resources (see watershed effects in Chapter III).

The No Action alternative A (because of reasonably foreseeable actions that are already scheduled or committed to) would not likely result in reductions of erosion and sediment sources and risks of riparian and instream damages that are present in the existing conditions; and they are compounded somewhat by the amount of new disturbances being introduced by logging or other vegetative management activities that exceed those being induced by the beetle infestations. Subbasin wide, the net effects would be continuation of the risks to water resources that in place under the existing conditions.

Table II-30. Project Area-wide comparisons (encompassing the three Ranger Districts).

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Net stream crossings (#)	-149	-291	-305	-320	-291	-241	-430
Net associated risk (tons/year)	-455	-1312	-1328	-1404	-1211	-986	-1711
Net roads (miles)	-77	-194	-203	-207	-193	-150	-261
Net encroaching road (miles)	-0.4	-7.0	-7.0	-7.5	-7.0	-4.7	-11.2

Similarly to the subbasin comparisons, all the alternatives including the no action alternative, indicate substantial overall watershed improvements distributed widely over the Newport-Priest-Coeur d'Alene project area. Substantial watershed improvements are ongoing or are reasonably foreseeable, even without any of the action alternatives of this project. However, all the action alternatives indicate accelerated improvement activities. Actual watershed restoration would be realized only at the smaller watershed and tributary scales.

Alternative G would result in the greatest reduction of erosion and sediment sources and risks of riparian and instream damages that are present in the existing conditions; and since there is only a minimal amount of new or compounded disturbances being introduced by logging or other vegetative management activities that exceed those being induced by the beetle infestations.

The action alternatives B, C, D, and E would result in the similar reductions of erosion and sediment sources and risks of riparian and instream damages that are present in the existing conditions; but they are limited

somewhat by the amount of new or compounded disturbances being introduced by logging or other vegetative management activities that exceed those being induced by the beetle infestations. Project-wide, the net effects would be substantial local water resource improvements that would be most evident in tributary areas. The improvements however are dominant in individual watersheds. Some watersheds would simply have no net effects in terms of risk to water resources (see watershed effects in Chapter III).

Action Alternative F and the no action alternative A (because of reasonably foreseeable actions that are already scheduled or committed to) would result in some reductions of erosion and sediment sources and risks of riparian and instream damages that are present in the existing conditions; but they are limited somewhat by the amount of new or compounded disturbances being introduced by logging or other vegetative management activities that exceed those being induced by the beetle infestations. Project-wide, the net effects would be substantial local water resource improvements that would be most evident in tributary areas.

Fisheries and Effects to Management Indicator Fish Species

The effects to Management Indicator fish species (MIS), cutthroat and bull trout, are assessed by several measurements. These include the following:

- *Amount of riparian vegetation removed is an appropriate surrogate for changes in stream temperature, habitat diversity, cover complexity and channel stability.*
- *Sediment delivery risk assesses potential sediment delivery from management activities; a majority of these risks are located where roads cross streams.*
- *Modifying culverts at stream crossings increases fish passage.*
- *The amount of encroaching road can be reduced by road obliteration.*

Sediment Delivery Risk Narrative

The changes in sediment delivery risk is best explained with a narrative. The short term effects are related to the number of new culverts crossing streams and the length of new road. Long-term effects are the amounts of annual risk of sediment delivery.

Coeur d'Alene Project Area: For all watersheds except Fernan, Alternative G would have the highest amount of sediment risk reduction. This is a direct result of road channel crossing upgrades (increased culvert size to meet 100-year-flow) and the removal of road channel crossings and encroaching roads. Alternatives C, D, and E respectively, would have the next highest risk reduction in sediment delivery. This is a direct result of road channel crossing upgrades (increase culvert size to meet 100-year-flow) to access timber harvest units and the removal of unmaintained crossings and roads. The No-Action Alternative (Alternative A) would have the lowest risk reduction in sediment delivery, except in the Fourth of July watershed, which is equal under all alternatives. Reductions in the risk of sediment delivery should be paralleled by decreases in bedload and sediment, thus changes in stream morphology could be positively affected, having net benefits to the composition and quality of fish habitat. The small amount of road building in riparian areas, in combination with upgrading culverts (thereby reducing risk) would not result in a significant cumulative effect to the Management Indicator Species within the watershed. Given the amount of roads within the cumulative effects areas, the benefits of restoration activities would be minimal but are a necessary first step towards restoration of watersheds. There would be a short-term increase in sediment under all alternatives (except Alternative A) with the replacement of stream crossings within previously-decommissioned roads or newly constructed roads. With the foreseeable removal of stream channel crossings under Alternative A, there would be a short-term increase in sediment in selected watersheds.

Priest Lake Project Area: All alternatives, other than the No Action Alternative (Alternative A) would result in a significant long-term decrease in the risk of failure at stream crossings. There would be, however, a short-term increase in risk within three of the cumulative watershed effects area related to temporary road building in Alternative B, Alternative D, and Alternative E. Because the temporary roads would not be located close to streams, they have only a low probability of delivering sediment to the stream; therefore, there would be no significant cumulative effects from these activities.

Newport Project Area: Except in Skookum, all alternatives, including the no action alternative (Alternative A) would result in no decrease in the risk of failure at stream crossing in all watershed analysis areas. The lack of reduced risk is due to private lands which need many of the roads for access. Under all action alternatives, there will be road obliteration and associated culvert removal in the Skookum watershed analysis area. There will be short term sediment delivery to Skookum associated with the culvert removal and long term reduction in risk of sediment.

Fisheries Measurements of Change

The following tables display the changes to fisheries under each alternative. Numbers shown in the table are approximate. For more detail, please see Chapter III "Fisheries" section for each Ranger District.

Table II-31. Effects to fisheries measurements of change, Coeur d'Alene River Ranger District.

Measurement	ALT. A	ALT. B	ALT. C	ALT. D	ALT. E	ALT. F	ALT. G
Riparian vegetation removed	0	576 ft	0 ft	1189 ft	576 ft	308 ft	0 ft
Fish passage increase	0.4 mi	2.5 mi	2.5 mi	5.0 mi	2.5 mi	0.4 mi	7.9 mi
Encroaching road reduction	0.3 mi	4.7 mi	4.7 mi	5.2 mi	4.7 mi	3.0 mi	8.9 mi

Table II-32. Effects to fisheries measurements of change, Priest Lake Ranger District.

Measurement	ALT. A	ALT. B	ALT. C	ALT. D	ALT. E	ALT. F	ALT. G
Riparian vegetation removed (feet)	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft	0 ft
Fish passage increase (miles)	0 mi	5.6 mi	5.6 mi	5.6 mi	5.6 mi	3.6 mi	5.6 mi
Encroaching road reduction (miles)	0.1 mi	1.9 mi	1.9 mi	1.9 mi	1.9 mi	1.3 mi	1.9 mi

Table II-33. Effects to fisheries measurements of change, Newport Ranger District.

Measurement	ALT. A	ALT. B	ALT. C	ALT. D	ALT. E	ALT. F	ALT. G
Riparian vegetation removed (feet)	0	0	0	0	0	0	0
Fish passage increase (miles)	0	0	0	0	0	0	0
Encroaching road reduction (miles)	0	0.4 mi	0.4 mi	0.4 mi	0.4 mi	0.4 mi	0.4 mi

Table II-34. Species viability (# of watersheds), Coeur d'Alene River District.

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt F	Alt G
Likely to result in long-term risk to individuals	0	1	1	1	1	1	0
Likely to result in no change	10	6	6	7	6	7	4
Likely to result in long-term reduction in risk to individuals	4	7	7	6	7	6	10
Likely to result in long-term reduction in risk to populations	0	0	0	0	0	0	0

Table II-35. Species viability (# of watersheds), Priest Lake Ranger District.

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Likely to result in long-term risk to individuals	0	0	0	0	0	0	0
Likely to result in no change	8	3	3	3	3	3	3
Likely to result in long-term reduction in risk to individuals	1	6	5	6	6	6	5
Likely to result in long-term reduction in risk to populations	0	0	1	0	0	0	1

Table II-36. Species viability (# of watersheds), Newport Ranger District.

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Likely to result in long-term risk to individuals	0	0	0	0	0	0	0
Likely to result in no change	6	5	5	4	5	4	4
Likely to result in long-term reduction in risk to individuals	0	1	1	2	1	2	2
Likely to result in long-term reduction in risk to populations	0	0	0	0	0	0	0

Key Issue: Road Management

The alternatives have a variety of proposed activities that would change road management. These activities affect water quality, wildlife habitat, spread of noxious weeds, fish habitat, scenery and people's access to the forest. New permanent roads provide more access to the forest and road obliteration removes access to the forest. Road reconstruction removes chronic sediment sources and potential road failures as well as improving driveability. As these issues have already been discussed within the watershed issue section, a comparison of the alternatives for road management follows in a table format.

Table II-37. Measurements of Change in Road Management (by approximate miles), Coeur d'Alene River Ranger District.

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt G
Permanent roads	0	0	0	3.9	0	0	0
Temporary roads*	0	7.8	0	14.9	7.9	4.8	0
Road reconstruction	0	19.6	18.3	27.7	19.6	13.2	13.2
Roads removed	0	68	68	86	68	40	121.3
Roads relocated	0	0	0	1	0	0	1
Open road density (mile/sq mile)	1.4	1.2	1.2	1.2	1.2	1.3	1.2
Miles of open road being closed	0	21	21	22	21	7	22

**Temporary roads are obliterated following use, but are not counted in the "Rds. Removed" line.*

Table II-38. Measurements of Change in Road Management (by approximate miles), Priest Lake Ranger District.

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	ALT. F	ALT. G
Permanent roads	0	0	0	0	0	0	0
Temporary roads*	0	13.0	0	14.4	12.5	7.2	0
Road reconstruction	0	80.8	79	81.3	80.8	40.0	65.3
Roads removed	0	53.0	54.7	54.2	51.9	34.1	54.2
Roads relocated	0	0.8	0.8	0.8	0.8	0.8	0.8
Open road density (mile/sq mile)	2.43	2.4	2.4	2.4	2.4	2.42	2.4
Miles of open road being closed	0	10.1	11.4	11.0	10.1	7.6	11.0

**Temporary roads are obliterated following use, but are not counted in the "Rds. Removed" line.*

Table II-39. Measurements of Change in Road Management (by approximate miles), Newport Ranger District.

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	ALT. F	ALT. G
Permanent roads	0	0	0	0	0	0	0
Temporary roads*	0	0	0	0	0	0	0
Road reconstruction	0	12.4	12.4	14.0	12.4	8.0	12.2
Roads obliterated	0	3.9	3.9	8.8	3.9	3.7	8.8
Roads relocated	0	0	0	0	0	0	0
Open road density (mile/sq mile)	2.59	2.55	2.55	2.52	2.55	2.56	2.52
Miles of open road being closed	0	3.3	3.3	6.4	3.3	3.1	6.4

**Temporary roads are obliterated following use, but are not counted in the "Rds. Removed" line.*

Key Issue: Activities In Old Growth

Measurement of Change: Treatment in old growth areas.

Table II-40. Acres of treatment in old-growth areas, Priest Lake Ranger District.

Alternative	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F	ALT. G
Approximate Acres Old Growth Treated	0	300	300	340	0	340	195

Key Issue: Fuel Loadings

The past 100 years of human activity within inland forested ecosystems has resulted in a significant change from historic patterns and is indicative of unhealthy ecosystem conditions. Over 100 years of timber harvest, approximately 70 years of effective fire exclusion, and introduction of non-native species have resulted in changes in vegetation species, composition, and structure. Because of these changes, low and mixed severity fires are now an improbable occurrence in many forests, severe stand replacing fires are more likely. Opportunities to reduce the intensity of potential fires are available with prescribed fire and mechanical fuels treatment. Timber harvests would affect both short- and long-term fuel loading. Treating Douglas-fir beetle infestation areas where harvest takes place provides an opportunity to reduce fuel loading and continuity within stands and over the analysis area and provides opportunities to reestablish seral species.

The no action alternative takes no new steps to interrupt the trend of increased fire intensity and severity. Action alternatives propose prescribed burning to reduce fuel accumulations and reintroduce seral species (ponderosa pine, white pine and larch) and make progress towards reducing potential intensities and severities of wildfire in beetle infested areas. Even with this treatment, untreated areas and areas treated with salvage harvest would continue to trend toward conditions that favor higher intensity wildland fires.

Measurements of Change: Fuels accumulation acres of increased fuel accumulation in beetle-infested areas remaining untreated; Acres treated with prescribed fire.

Table II-41. Approximate Acres of increased fuel accumulations remaining untreated, and prescribed fire treatments.

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Coeur d'Alene River RD							
Fuels accumulation acres to remain untreated	26,700	16,469	16,469	14,477	16,469	17,036	25,585
Prescribed fire acres	0	867	867	1,829	373	7,034	1,115*
Priest Lake RD							
Fuels accumulation acres to remain untreated	11,221	5,840	5,840	3,738	6,144	7,211	10,845
Prescribed fire acres	0	3,090	3,030	3,705	1,929	1,946	366
Newport RD							
Fuels accumulation acres to remain untreated	5,275	3,754	3,754	513	3,754	1,891	2,539
Prescribed fire acres	0	896	896	3,269	896	2,443	2,736

* *Includes wildlife/ecosystem burning acres.*

CHAPTER III AFFECTED ENVIRONMENT and ENVIRONMENTAL CONSEQUENCES

OVERVIEW

This chapter provides a characterization of historical and broad-scale resource conditions. It also describes the existing conditions of specific resources and the direct, indirect and cumulative effects of alternative implementation on Project Areas for each of the three Ranger Districts -- Coeur d'Alene River, Priest Lake, and Newport. The chapter has been divided by Ranger District with the Coeur d'Alene River Ranger District in Volume I of the Final EIS and Priest Lake and Newport Ranger Districts in Volume II.

The Ecosystem Setting for the Idaho Panhandle National Forests portion of the project (Coeur d'Alene River and Priest Lake) follows this overview of the chapter. The Ecosystem Setting for the Newport Ranger District is located in Volume II at the beginning of the Newport Ranger District discussions of Affected Environment and Environmental Consequences.

The following list of resource components were analyzed for this EIS. The current conditions (displayed as Affected Environment) and the potential affects on these resources (displayed as Environmental Consequences) are discussed in the order given below.

1. Vegetation
2. Threatened, Endangered, and Sensitive Plants
3. Noxious Weeds
4. Watershed
5. Soil Productivity
6. Fisheries
7. Fuels and Fire Behavior
8. Air Quality
9. Wildlife
10. Recreation
11. Scenery
12. Heritage and Tribal Interests
13. Finances
14. Transportation Planning

Each resource section utilizes a similar format to describe the environment and the environmental consequences of the proposed action and each alternative. The components of that format are as follows:

- Changes between the Draft and the Final Environmental Impact Statement,
- Regulatory Framework - a brief discussion of laws, regulations and policies which apply to this project,
- Affected Environment,
- Environmental Consequences including the methodology used to study the resource and the direct, indirect and cumulative effects of the alternatives.

The Conclusion section at the end of this chapter discloses the potential cumulative effects across the Douglas-fir Beetle project area (combined Coeur d'Alene River, Priest Lake, and Newport Ranger Districts project areas). It also summarizes adverse effects which cannot be avoided, short term uses and long term productivity of the various resources, irreversible and irretrievable effects, as well as potential conflicts with known land use plans.

ECOSYSTEM SETTING - COEUR D'ALENE RIVER AND PRIEST LAKE RANGER DISTRICTS

Columbia River Basin

Based on recent findings presented in the Interior Columbia Basin Ecosystem Management Project (ICBEMP), disturbances such as those related to fire and insect mortality have played an important role in determining forest composition throughout the Interior Columbia Basin. In addition to natural disturbance, the Columbia Basin assessment found land management activities and introduced pathogens, such as blister rust which kills white pine, have dramatically altered the species and age composition of vegetation resulting from a natural disturbance regime.

Ecological integrity, as discussed in the Columbia Basin and smaller landscape scale "step-down" assessments, is the wholeness or completeness of an ecosystem, the degree to which it has all the parts and processes it needs to function properly.

- Resiliency--the ability to withstand fires and other disturbances.
- Supportive of native and desired non-native species diversity
- Consist of a mosaic of well-connected habitats
- Have functions, such as seed dispersal and decay, and processes, such as nutrient and water cycles, that operate effectively. (ICBEMP Summary, 1996)

Northern Region Assessment

The Northern Region Overview, discussed in more detail in the introductory section of Chapter I, focused on priorities for restoring ecosystem health and availability of recreation opportunities in northern Idaho and Montana. The assessment also described the changes in vegetation that are contributing to the current beetle infestation.

The Northern Region Overview findings conclude that there are multiple areas of concern in the Northwest Zone of the Region, but that "this subregion holds the greatest opportunity for vegetation treatments and restoration with timber sales. From a social and economic standpoint, using timber harvest for ecological restoration would be a benefit to the many communities which still have a strong economic dependency, more so than in other zones in the Region. Aquatic restoration should be focused on specific needs based on the zone aquatic restoration strategy." (page 9, Northern Region Overview Summary (USDA April, 1999) The timber management (timber harvest) tool best fits with the forest types in northern Idaho and is essential, for example, to achieve the openings needed to restore white pine and larch, and maintain upland grass/shrub communities.

Geographic Assessments

Concurrent with this Northern Region study, the Idaho Panhandle National Forests began gathering more detailed ecosystem information for the major river basins within the Forests. These subbasin reviews, called Geographic Assessments (GAs) throughout this document, are integrated ecosystem assessments at a mid-scale landscape level. For further descriptions of the Geographic Assessments, see the vegetation section in Chapter III for each District.

Watershed Assessments

The six-step process outlined in the "Ecosystem Analysis at the Watershed Scale" (Regional Interagency Executive Committee and Intergovernmental Advisory Committee, 1995) was followed for analysis areas at smaller watershed scales. It was used for further analysis to identify current and reference conditions, to identify key issues, to synthesize and interpret analyses results, and to develop recommendations. More information on use of this process is located in the introductory section of Chapter I and in the separate Ranger District sections which follow within Chapter III.

Location of the Douglas-fir Beetle Project

The Coeur d'Alene River and Priest Lake Project Areas are located on the Idaho Panhandle National Forests (IPNF). The analysis areas for these two project areas totals about 400,000 acres, including other ownerships as well as National Forest System lands.

The IPNF project areas are scattered north of the community of Priest River and to the east and southeast of the city of Coeur d'Alene. These towns are about 35 airmiles from each other. The Vicinity Map in the map packet displays the project area locations.

The IPNF Forest Plan (USDA, 1988), provides management direction for this area, including guidelines concerning insect and disease outbreaks. All lands on the Forest are divided into management areas (MA's), which emphasize specific resources through management prescriptions. The goals of each MA is briefly described in Chapter I, detailed information is provided Chapter III of the Forest Plan pages III-1 through III-88.

The Biology of the Douglas-fir Beetle

The Douglas-fir beetle (*Dendroctonus pseudotsugae)* infests and kills Douglas-fir throughout most of its range in the western United States, British Columbia and Mexico. At low or endemic levels, the beetle infests scattered trees, including windfalls, and trees injured by fire scorch, defoliation, or root disease; or in a weakened condition due to drought. Where such susceptible trees are abundant, beetle populations can build up rapidly and spread to adjacent green, standing trees (Schmitz and Gibson 1996).

Susceptibility is greatest in stands having the following characteristics:

- Basal area per acre is greater than 120 square feet,
- Douglas-fir species composition is greater than 30%,
- Douglas-fir diameters (dbh) are greater than 14 inches, and
- The stand is more than 120 years old.

Historic Douglas-fir Beetle Outbreaks

One of the earliest recorded Douglas-fir beetle outbreaks in northern Idaho was during the period of 1950-52 (Timber Industry, Bureau of Entomology and Plant Quarantine, USDA Forest Service, 1953). It is likely that heavy snows in the winter of 1948-49 resulted in significant blowdown and breakage which most likely triggered the Douglas-fir beetle outbreak. On lands now administered by the Idaho Panhandle National Forests, an estimated 338,600 acres were infested. During this outbreak, some timber stands lost up to 80% of the mature Douglas-fir component.

On the Clearwater National Forest from 1970-74, an outbreak occurred after Douglas-fir beetles reproduced in trees felled during the clearing for Dworshak Reservoir and in snow-broken Douglas-fir surrounding the reservoir (Furniss, McGregor, Foiles and Partridge 1979). An estimated 288,000 acres were infested and 111 million board feet of sawtimber recorded as salvageable.

Another outbreak on the IPNFs occurred from 1987-1990 when 31,900 acres were infested and 38 million board feet were killed (Kegley 1998).

Recent endemic Douglas-fir beetle distribution and infestation levels in the subbasin have been high. Dry years have been frequent in the last decade; Douglas-fir root disease has also expanded. Due to the increase in Douglas-fir which resulted from exclusion of wildfire, white pine blister rust, and past logging practices; Douglas-fir beetle outbreaks have the potential to occur over large areas.

Douglas-fir beetle outbreaks are generally of short duration in the coastal Douglas-fir region but last longer in the Rocky Mountains (Furniss and Carolin 1980). Outbreaks average four years in eastern Washington (Flanagan 1998). Beetle populations are expected to decline over the next two years, but additional tree mortality is expected.

Weather may influence the survival of Douglas-fir beetle populations. Cool, wet conditions in the spring during the beetles' flight period are probably more important than cold winter temperatures. Constant cool, rainy spring weather may disrupt the flight period and cause the beetles to be exposed to adverse conditions for longer than normal periods of time. Conversely, warm dry weather in the spring is beneficial to the beetles. Cold temperatures experienced by overwintering Douglas-fir beetles have been recorded only once as causing significant beetle mortality. This occurred in 1955 when extreme sudden and severe cold weather occurred in early November in British Columbia at a time when the beetles were probably not yet prepared for such conditions (McMullen 1956). However, severe temperatures that occurred in mid-November 1955 and again in February, 1956 in Idaho failed to cause widespread unusual overwinter mortality of Douglas-fir beetles (Furniss 1956).

More detailed temperature studies have been conducted on a closely related beetle, the mountain pine beetle. Winter temperatures below -34 degrees Fahrenheit may affect mountain pine beetles infesting lodgepole pine in low-lying areas; however, beetles survive on warmer slopes, in thicker barked trees and in portions of tree trunks below snow line (Amman et al. 1989). It is reasonable to conclude that survival would be greater for Douglas-fir beetles in thicker barked Douglas-fir trees. Air temperatures below -20 degrees Fahrenheit for several days in December 1990 were insufficient to cause a decreasing population trend in mountain pine beetles in ponderosa pine (Schmid et el. 1993).

Several natural enemies have been recorded feeding on Douglas-fir beetles. Among those regarded as important in natural control of the Douglas-fir beetle are the predatory beetles *Enoclerus sphegeus, Thanasimus undatulus,* and *Temnochila chlorodia;* and the parasites *Coeloides vancouverensis* and *Medetera aldrichii* (Marsden et al. 1981, Furniss & Carolin 1980). However, numbers of natural enemies appear to be independent of prey density. Their influence increases after the bark beetle population subsides. Douglas-fir beetle populations are maintained at normal levels primarily by tree resistance (Furniss et al. 1981). Woodpeckers are not important predators of the Douglas-fir beetle (Schmitz & Gibson 1996).

Current Douglas-fir Beetle Outbreak

Information on the current beetle outbreak was obtained through an aerial insect detection flight conducted in the late summer of 1998, and on-the-ground surveys of sites with active beetle populations in the fall and early winter of 1998.

Populations of Douglas-fir beetles increased after breeding in large amounts of Douglas-fir trees that were wind thrown and broken by snow and ice during the winter of 1996-97. The beetle population grew, breeding in the large, downed Douglas-fir through the spring and summer of 1997. Some standing, live trees were attacked this first year, but many more were attacked in the spring, summer and fall of 1998. The warm and dry summer of 1998 provided optimum conditions for a late summer beetle flight. With the trees in a weakened condition due to the dry summer, and the rapid growth of the beetle population, the tree mortality reached an epidemic level. In

many areas, live trees were covered with the dust from beetles boring into the bark (frass). Special traps placed in the woods to monitor beetle flight confirmed that beetle activity was epidemic in level.

It normally takes one year for currently infested trees to fade. However, because of the abnormally hot and dry summer, some fading trees appeared in the late summer of 1998. Aerial detection flights in the late summer of 1998 were used to assess the location and magnitude of the outbreak. The number of dead trees varied from a few scattered individuals to entire stands where most of the large Douglas-fir have been killed. The detection flights could only pick up those trees which were showing symptoms (the crown was starting to turn yellow or red) of the Douglas-fir beetle attacks. There may have been some areas where affected trees were not yet showing symptoms and were therefore not mapped during the flight.

Field inspections indicated that the number of trees actually attacked by beetles was much higher than the number of trees showing the symptoms of these attacks. Results of preliminary ground surveys indicated that there were from 1 to 19 green infested trees for every fading tree. The average was about 8 trees attacked by beetles for each one showing obvious crown symptoms at the time of the detection flight. Groups of from 3 to 200 trees were beginning to fade by fall of 1998. The full extent of the 1998 infestation won't be readily apparent from aerial surveys until the remaining currently infested trees fade during summer 1999.

The current beetle outbreak could be as large as the outbreaks that occurred in the early 1950s and 1970s, especially if drought conditions continue. The Forest Service assembled a group of 24 scientists and researchers[1] from several western states in December 1998 to review this specific beetle outbreak and the Forest Service's proposed actions. They estimate the IPNFs have currently experienced about fifty percent of the total mortality that will develop. Across the IPNFs, 250,000 acres rated as moderate and high hazard to Douglas-fir beetle attack.

Stands with a high component of large Douglas-fir (greater than 14 inches in diameter) are most susceptible to attack and are likely to lose the greatest number of trees (Lockman, B., Gibson, K., 1998). Douglas-fir mortality is likely to occur in groups of trees due to the pheromones produced by the bark beetles which attract more beetles to the area. This leads to mass attacks where 60-80 percent of the large Douglas-fir can be killed (Flanagan, P., 1998). Smaller diameter trees are also often attacked when they occur near these groups, especially in denser stands.

Reasonably Foreseeable Activities

The effects analysis also considered other activities on each of the Ranger Districts that are either reasonably foreseeable or are actually ongoing at this time. These project activities are identified in Appendix E - Reasonably Foreseeable Activities and the potential effects are described in the resource sections of this chapter.

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[1] *Dr. Bary Daterman, Dr. Ladd Livingston, Dr. Darrell Ross, Dr. Jose Negron, Dr. Karl Stoszek, Sandra Kegley, Carol Randall, Karen Johnson, Ken Gibson, Karen Ripley, Larry Stipe, Dayle Bennett, Ralph Thier, Dr. Nancy Strudevant, Dr. Paul Flanagan, Dr. Darryl Jewett, Dr. Jim Byler, Dr. Field Cobb, Dr. Gregg DeNitto, Craig Schmidtt, Dr. Robert James, Jim Hadfield, Blakey Lockman, and Dr. Arthur Zack.*

VEGETATION

CHANGES BETWEEN THE DRAFT AND FINAL IMPACT STATEMENT

In response to comments and recognition of errors in the Draft EIS, the Final EIS has changes in the vegetation section. A brief summary of the changes follows: the characterization of the Coeur d'Alene project area has been expanded to better describe the habitat type groups. Minor changes have taken place in the analysis numbers in most alternatives. Many wording and other editing changes have taken place to further clarify the descriptions of information provided. Alternative G has been added and analyzed in response to comments. There is expansion on the description of cumulative effects and foreseeable actions.

REGULATORY FRAMEWORK

Federal legislation, regulations, policy and direction that require protection of species and population viability, evaluation and planning process consideration of threatened, endangered and other rare (Forest Service "sensitive") plant species include the Endangered Species Act (1973) as amended; the National Forest Management Act (1976); the National Environmental Policy Act (1969); Forest Service manual (2672.1-2672.43); Idaho Panhandle National Forests, Forest Plan (1987); and direction from the Regional Watershed, Wildlife, Fisheries and Rare Plants program and Washington Office.

Regulatory constraints applying to the management of timber resources include the Forest Practices Act, Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), National Forest Management Act of 1976 (NFMA), and Forest Service policy.

RPA states, "It is the policy of Congress that all forested lands in the National Forest System be maintained in appropriate forest cover with species of trees, degree of stocking, rate of growth, and conditions of stand designed to secure the maximum benefits of multiple use sustained yield management in accordance with land management plans."

Plans will be developed which specify guidelines to identify the suitability of lands for resource management; provide for the diversity of plant and animal communities based on the suitability and capability of land areas to meet multiple-use objectives; where appropriate, to the degree practicable, preserve the diversity of tree species similar to that existing in the planning area; insure that timber will be harvested from National Forest System Lands only where soil, slope, or other watershed conditions will not be irreversibly damaged; the lands can be adequately restocked within five years after harvest; protection is provided for streams, streambanks, shorelines, lakes, wetlands, and other bodies of water where harvests are likely to seriously and adversely affect water conditions and fish habitat; and the harvesting system used is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber.

Any cut designed to regenerate an even-aged stand of timber must be determined to be appropriate to meet the objectives and requirements of the land management plan and, in the case of clearcutting, is the optimum method; has had an interdisciplinary review of impacts and the cuts are consistent with the multiple use of the general area; will be shaped and blended, to the extent practicable, with the natural terrain; meets established, suitable size limits; and is carried out in a manner consistent with protection of soil, watershed, fish, wildlife, recreation, esthetic resources, and the regeneration of the timber resource.

NFMA amended RPA and requires that stands of trees shall generally have reached the culmination of mean annual increment of growth prior to harvest; this does not preclude the use of sound silvicultural systems such as thinning and other stand improvement measures and also allows salvage or sanitation harvest following fire, windthrow, or other catastrophe or within stands in imminent danger of insect and disease attack.

Forest Service policy directs land managers to:

1) *Use only those silvicultural practices that are best suited to the land management objectives for the area. Consider all resources, as directed in the appropriate forest plan.*

2) *Prescribe treatments that are practical in terms of cost of preparation, administration, transportation systems, and logging methods.*

3) *Monitor practices, using procedures specified in forest plans to ensure objectives are met.*

4) *Before scheduling stands for regeneration harvest, ensure, based on literature, research, or local experience, that stands to be managed for timber production can be adequately restocked within 5 years of final harvest. Five years after final harvest means five years after clearcutting, final overstory removal in shelterwood cutting, the seed tree removal cut in seed tree cutting or after selection cutting.*

5) *Perform all silvicultural activities in the most cost effective manner consistent with resource management objectives.*

Forest Service policy further directs that:

6) *The size of tree openings created by even-aged silvicultural methods will normally be 40 acres or less. With some exceptions, creation of larger openings will require 60 day public review and Regional Forester approval.*

7) *For management purposes, cut areas created by even-aged management will no longer be considered openings when both vegetation and watershed conditions meet management objectives established for the management area.*

Management activities will promote programs that provide a sustained yield of forest products consistent with the multiple-use goals established in Regional Guides and the Forest Plan. Timber management activities will be the primary process used to minimize the hazards of insects and diseases and will be accomplished primarily by maintaining stand vigor and diversity of plant communities and tree species.

Protection of timber stands from insect and disease problems will center around the silvicultural treatments prescribed for timber management activities.

Proposed activities will be consistent with Management Area objectives. Descriptions and objectives of these Management Areas are included in the Forest Plan.

AFFECTED ENVIRONMENT

Introduction

The vegetation in northern Idaho is a result of the prevailing climatic pattern in which westerly winds carry maritime air masses from the northern Pacific across the northern Rocky Mountains during winter and spring. This weather pattern is characterized by precipitation occurring mainly between November and February, with only 12 percent of the annual precipitation occurring between July and September (IPNF 1998). The inland maritime air flow provides northern Idaho with abundant moisture and moderate temperatures.

The subbasins of northern Idaho contain diversity of habitats and plant communities, many of which contain plant species that are known or thought to be rare. Of the estimated 1,200 to 1,500 plant species known or thought to occur here, about 10 percent are considered rare or uncommon. There are no federally listed endangered plants for the IPNFs. Two species are listed as threatened for the IPNF. There are no

documented occurrences of these species although suitable habitat is thought to occur. Thirty one species of sensitive plants known or suspected to occur within the subbasin.

Habitat Types

The vegetation in the Coeur d'Alene subbasin reflects the climatic conditions discussed above. "Habitat typing" is a land classification system based on the potential climax natural vegetation that could occupy a site. Habitat types are named for the potential climax community type or plant association, which is denoted by the climax tree species (usually the most shade tolerant tree adapted to the site), and the dominant or indicator undergrowth species of the plant association (Cooper et al. 1991). The climax tree species denoted in a habitat type is not necessarily dominant or even present on the site. A very high percentage of forested landscapes reflect some degree of disturbance resulting in a preponderance of seral stages. Forest Habitat Types of Northern Idaho: a Second Approximation (Cooper et al. 1991) was the basis for determining habitat types in the Coeur d'Alene subbasin.

Within the project area, the most common habitat types are western hemlock/queencup beadlily and grand fir/queencup beadlily, which account for approximately 35 percent and 32 percent respectively of National Forest lands. Western hemlock/wild ginger and Douglas-fir/ninebark habitat types are each present on approximately nine percent of the area. The remaining 15 percent is made up of a variety of other habitat types.

Threatened and sensitive plants and Forest species of concern can be assigned to one or more rare plant guilds. These guilds are artificial assemblages based on similar habitat requirements used for the purpose of analysis. For the Idaho Panhandle National Forests, the rare plant guilds are aquatic, deciduous riparian, peatlands, cold forest, wet forest, moist forest, dry forest and subalpine. Rock seeps and springs are another habitat that can support certain sensitive plants, however these can occur across all guilds and are not identifiable at a coarse scale (see Appendix B for specific plant guild descriptions).

Habitat Type Groups

Although every habitat type is unique in some way, they can be grouped based on similarities in natural disturbance regimes, successional patterns and structural characteristics of mature stands (USDA Forest Service, Region One, 1996).

The majority of the habitat types within the project area are in the Dry and Moist Habitat Type Groups. The lowest elevations on the western edge of the Coeur d'Alene Basin are the warmest and driest.

Warm, Dry Habitat Type Group

The habitat types of this group within the Coeur d'Alene project area consist primarily of Douglas-fir/ninebark and grand fir/ninebark types. The current forest cover types are dominated by Douglas-fir (84 percent), with ponderosa pine and grand fir being the major species on eight percent and six percent, respectively, of the dry habitat types. Historically, many of these sites were maintained in open-grown stands of ponderosa pine and Douglas-fir with grass and brush understories (USDA Forest Service, Region One, 1996). The natural fire-free interval was approximately five to 50 years. Stand replacement fires were relatively infrequent under natural disturbance regimes. Approximately 21 percent of the bark beetle mortality occurs within this habitat type group, although the group is only present on about 16 percent of the project area. There are several reasons for this. The ice storm damage that initiated the current outbreak occurred mainly at lower elevations on the west side of the Coeur d'Alene District where most of these drier habitat types exist. Douglas-fir is often a major component of these drier habitat types, and Douglas-fir on these sites may have been more susceptible to successful attack due to the relatively hot, dry conditions that existed during beetle flight in 1998. Sensitive plants of the dry forest guild are most likely to be located within these habitat types.

Warm, Moist Habitat Type Group

The habitat types of this group within the Coeur d'Alene project area consist primarily of western hemlock/queencup beadlily and grand fir/queencup beadlily. The current forest cover types are dominated by grand fir (41 percent) and Douglas-fir (37 percent). Western hemlock and cedar are the major species on eight percent and five percent, respectively, of the area within the moist habitat type group. Prior to the introduction of blister rust, with over 40 percent of these areas dominated by white pine, the area was known as the "white pine type". Currently, one percent of the Coeur d'Alene River project area is classified as western white pine forest cover type. Historically, these habitat types had fire-free intervals of 40 to 130 years or more (Zack and Morgan 1994). Stand replacement fires, while infrequent, could be severe during times of drought. Approximately 79 percent of the bark beetle mortality occurs within this habitat type group. Sensitive plants of the moist and wet forest guilds are most likely to be located within these habitat types.

Cool, Moist and Cool, Dry Habitat Type Groups

These habitat type groups account for about two percent of the Coeur d'Alene project area. The major types in the group include subalpine fir/beargrass, subalpine fir/queencup beadlily and subalpine fir/menziesia. There are no Douglas-fir beetle attacks within these habitat types. Sensitive plants of the subalpine forest guild are most likely to be located within these habitat types.

Table III-1. Habitat type group distribution within analysis areas and beetle outbreak areas.

	Dry Habitat Type Group	Moist Habitat Type Group	Other Habitat Type Groups
Percent of All Analysis Areas by Habitat Type Group	16%	82%	2 %
Percent of Douglas-fir Beetle Areas by Habitat Type Group	21%	79%	0%

Characterization

Coeur d'Alene River Basin Geographic Assessment

Because of the local variation in landscape change throughout the Columbia Basin, the IPNFs have completed a Geographic Assessment for the Coeur d'Alene River subbasin. This assessment provides a description of the historic and current ecological, social and economic conditions of the subbasin. The condition descriptions were used to characterize the analysis areas infested by Douglas-fir beetles. Findings of the Geographic Assessment, at least in relation to vegetation disturbance, are very similar to more broad-scale conclusions found at the Columbia Basin and Northern Region scales:

1. *Disturbance and successional regimes have been altered since the Euro-settlement in North Idaho.*

2. *There has been a substantial reduction in the percent of the landscape composed of early seral species such as western white pine, ponderosa pine, and larch. This is primarily the result of fire suppression, timber harvest and the introduction of white pine blister rust.*

3. *There has been a major reduction in old growth forest structure while intermediate aged forest has increased dramatically. This is primarily the result of timber harvest focusing in older trees, fire suppression and the introduction of white pine blister rust.*

4. *Landscape patterns have been modified by timber harvest and exclusion of fire. Current landscape patterns are more uniform. Old growth patches are smaller in size. Approximately the same percentage of the landscape is in openings but the openings are more numerous, smaller in size, and scattered across the watersheds.*

The purpose of the Geographic Assessment was to develop a scientifically-based understanding of the processes and interactions occurring in the project area, so that activities can be developed to promote healthy ecosystems. In order to maintain healthy, sustainable ecosystems, it is important that species are well-adapted to the environmental variability inherent in the ecosystem and to maintain forest structures necessary to support ecosystem diversity and productivity. This is consistent with the Columbia Basin Assessment (ICBEMP) and the Northern Region Assessment. The Geographic Assessment suggests converting shade-tolerant/drought-,and fire-intolerant species to shade-intolerant/drought- and fire-tolerant species. These recommendations were considered by the project interdisciplinary team as they developed the proposed alternatives.

Findings of the ICBEMP and the Geographic Assessment also indicate that there is an increased risk of stand replacement fire on the drier habitat types due to fuel accumulations resulting from fire exclusion. Most of the fuels are in the form of green trees within overstocked stands, where dense crowns can now support crown fires. This green undergrowth provides fuel ladders which increase the risk of crown fires.

Disturbance and Successional Patterns

Fire

Prior to European settlement in the Coeur d'Alene River subbasin, fire was the most important disturbance occurring across the landscape. Zack (1994) described fire history within the Coeur d'Alene subbasin and indicated that fires covering greater than five percent of this forest occurred on an average of approximately once every 20 years.

It is probable that Native Americans (primarily in the Rathdrum valley and lower major river valleys) used fire to create better forage for horses and wildlife (improve hunting) and to remove brush and shrubs from camping sites (IPNF 1998). These fires were set quite frequently, resulting in low intensity fires that probably covered large areas. Prevailing westerly winds would tend to push these fires into the mountains to the east. At higher elevations, topography and improved moisture regime would tend to create a mixed severity fire with some creeping underburn and some crowning that killed small groups of trees. In particularly dry years, fires may have caused mortality over extensive areas.

In the denser forested environment further removed from Native American settlements, lightning-caused fires were probably more important in determining vegetation patterns across the landscapes. Lightning is a common occurrence in the Coeur d'Alene subbasin. These fires probably burned in a variable pattern depending on weather conditions preceding and following the fire starts. In "normal" years these fires may have burned one to 100 acres before being stopped by summer rains. In particularly dry years when fire starts were followed by high wind events, high intensity fires could cover tens of thousands and hundreds of thousands of acres. These fires often killed most trees and ground vegetation within the fire perimeter, leaving islands of trees and widely scattered individual trees in moist areas or where recent low intensity fires had removed ladder fuels from the understory. This mixture of moderately frequent, mixed severity fires and infrequent high intensity fires created a landscape of large blocks of old and mature forest with smaller areas of younger age classes. It also created large blocks of younger forests with smaller areas of mature and old age classes (IPNFs 1998).

Forest vegetation in north Idaho was historically dominated by species such as ponderosa pine, western larch and western white pine. These long-lived tree species typically establish after some form of disturbance and have the potential to occupy a site for two to three hundred years. Stands of these trees were adapted to the

variable intensity fire regimes common to the area. Natural levels of insect populations, along with wind and winter storm damage, contributed to stand mortality and, over time, created conditions for large stand replacing fires.

In the mesic upland areas, the mosaic created by moderately frequent, variable intensity burns with infrequent high intensity fires has been altered. Fire suppression efforts have largely eliminated the low intensity and small, variable intensity fires from the system. Drier south facing slopes that would have contained mixed open stands of ponderosa pine, larch and Douglas-fir with little understory now have denser tree cover with a higher component of Douglas-fir and grand fir and understories of dense shrubs or shade- tolerant reproduction. In general, drier sites have become more susceptible to stand replacing fires because of dense multi-storied structures. The shift to more Douglas-fir and grand fir has also made stands much more susceptible to root diseases.

Logging

Euro-settlement since the latter part of the 1800s has also influenced forest vegetation. In some cases, trees were cut to clear land for agricultural uses, and in other cases the objective was to provide a variety of wood products. Through the early part of this century, most trees harvested for wood products were the largest and most valuable; generally white pine, western larch and ponderosa pine. White pine mortality, caused by white pine blister rust and mountain pine beetle, led to an aggressive effort to salvage this species to recover its economic value. These species-selective harvests tended to leave stands of poor quality grand fir, Douglas-fir and western hemlock. Only in stands that were burned accidentally or to treat slash did early seral species have an opportunity to regenerate. Even where white pine seedlings were able to become established, they were often quickly killed by blister rust, thus allowing other species to dominate the site.

In the latter part of this century, timber harvests have often tended to remove the lower quality species as well as the more valuable ones. These types of harvests were on a smaller scale than natural disturbance regimes, creating a highly fragmented landscape of old growth patches adjacent to newly regenerated stands of 20 to 100 acres in size. Before the introduction of blister rust-resistant white pine, these regenerated stands were often planted with Douglas-fir. Once blister rust-resistant stock became available and the insect and disease problems of Douglas-fir were recognized, planting shifted to white pine, ponderosa pine and western larch.

Root Disease

Historically, root diseases were significant factors in reducing the competition from Douglas-fir and grand fir to maintain western white pine, western larch and, on some sites, ponderosa pine. Douglas-fir tended to regenerate readily in the early stages of stand development, but dropped out as a significant component due to high rates of root disease caused mortality (Byler and Zimmer-Gorve 1990). Western white pine, ponderosa pine and larch have a high level of resistance and were able to capitalize on this reduced competition. Fire exclusion and the loss of these species through logging and blister rust have reduced the opportunity for early seral species to become established in root disease areas. Root disease is currently the most prominent landscape-altering process in the Coeur d' Alene subbasin (IPNF 1998).

Douglas-fir Beetle

Douglas-fir beetles have always been present throughout the Coeur d' Alene subbasin. The presence of root disease in many of the Douglas-fir forest types has resulted in high endemic levels of the Douglas-fir beetle and the propensity for rapid beetle population build ups during favorable conditions (Lockman and Gibson 1998). Douglas-fir beetle outbreaks occur following disturbances such as windfall, snow breakage or fire. In particularly dry years, insect infestations and mortality could increase dramatically. Short-term increases in fuel loading may have led to increased crowning of moderate severity fires and created small to large openings for the reintroduction of seral species. In some cases, these insect infestations may have contributed to large stand replacing fires (IPNF 1998).

Loss of White Pine

White pine blister rust was introduced into this area in the early 1900s. Eventually, white pine was infected over the entire Coeur d' Alene subbasin; trees were either killed or there was an accelerated harvest to recover their economic value. The loss of mature white pine and the continuing mortality of younger trees led to the increase in Douglas-fir, grand fir and hemlock.

Current Situation

The findings of the Geographic Assessment for the Coeur d'Alene River subbasin indicate that there has been a tremendous change in both species composition and stand structure within the Coeur d' Alene project area.

Long-lived seral species (western white pine and western larch) have declined within the Coeur d' Alene subbasin as a result of white pine blister rust and timber harvesting that tended to remove these species while leaving species such as grand fir, hemlock and Douglas-fir. On the drier sites, aggressive fire suppression has allowed the encroachment of Douglas-fir and grand fir into the understories, creating much denser stands over larger areas and increasing the potential for stand replacing fires.

The white pine cover type has declined by more than 94 percent in the past 100 years. Grand fir/western hemlock cover types increased by 677 percent. Larch forest types have decreased by 68 percent, and the Douglas-fir type has shown a 40 percent increase (IPNF 1998).

In terms of forest structure, the greatest changes have been in the amount of old growth and pole/medium sized timber found on the landscape. Old growth has declined from a historic average of about 21 percent of the area to less than four percent (Figure III-2). This was generally the result of the aggressive harvest of white pine and larch and the loss of white pine to blister rust. The large fires in the first half of this century also played an important part in reducing the old forest component. Today, old growth on National Forest lands within the Coeur d'Alene subbasin tends to be in areas not burned in the 1910 fires; it also tends to be fragmented by past timber harvest and road construction. Stands of grand fir and Douglas-fir that have replaced white pine and larch in the ecosystem and that are encroaching on the ponderosa pine on drier sites are very susceptible to root disease and insect attack. These stands are unlikely to provide the same closed canopy, multi-storied mature and old forest structure containing large white pine and larch that was once a major component of the Coeur d'Alene River Ranger District. Although these stands may contain large old trees and provide some old growth characteristics, openings caused by root disease may be common, and a key component of remnant white pine and larch will be missing.

Figure III-1. Historic and current cover types, Coeur d'Alene River Basin.

PP = ponderosa pine	WWP = western white pine	WL = western larch
DF = Douglas-fir	GF/WH = grand fir/western hemlock	WRC = western red cedar
LP = lodgepole pine	SAF/MH = sub-alpine fir/mountain hemlock	HRDWD = hardwood

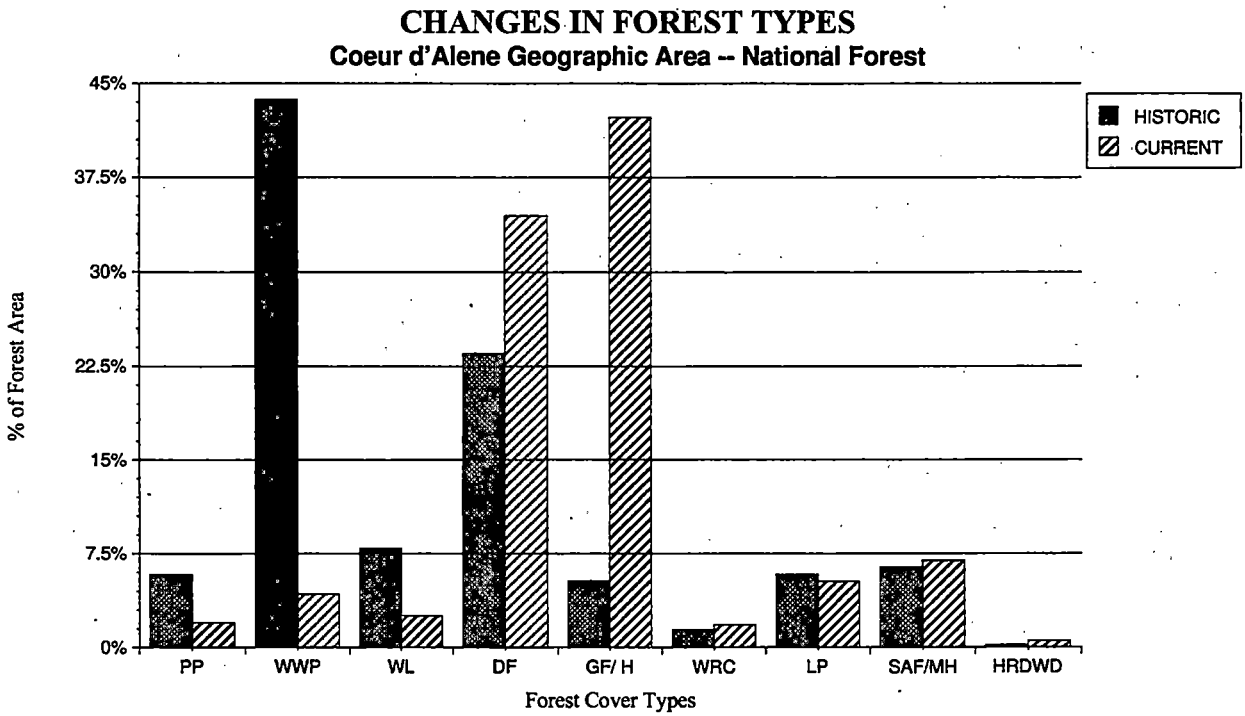
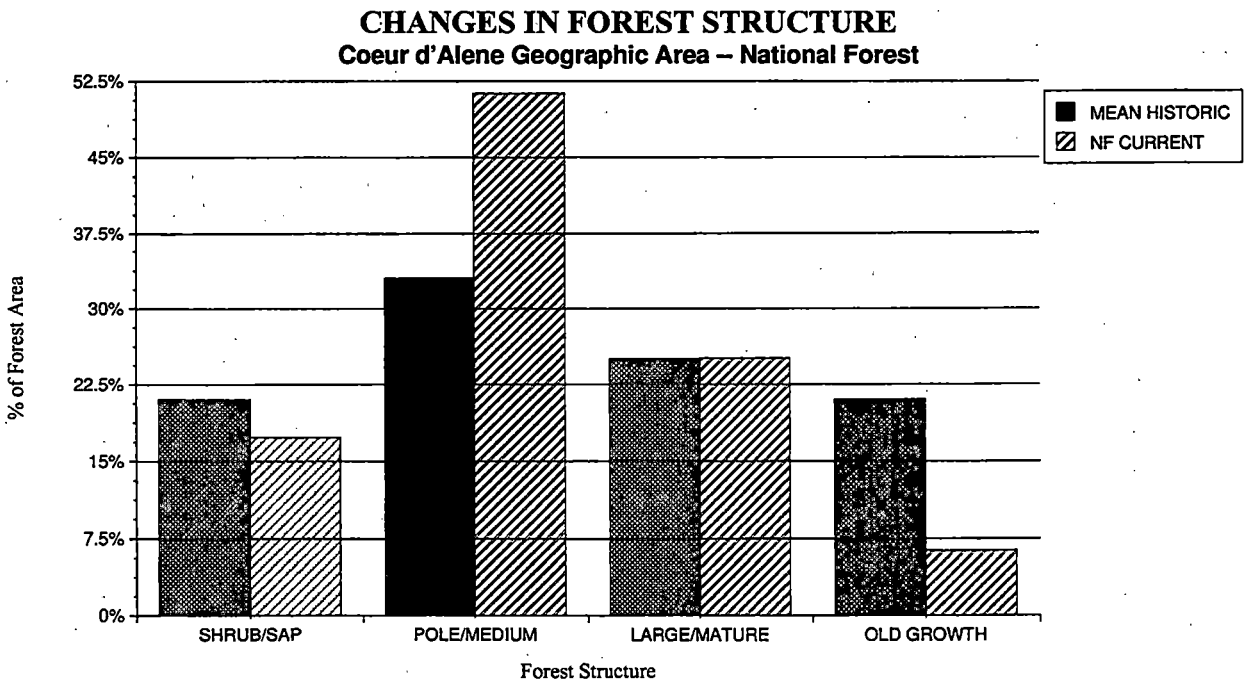


Figure III-2. Historic and current size classes, Coeur d'Alene River Basin.



Current Douglas-fir Beetle Outbreak

As stated previously, the current Douglas-fir beetle outbreak began in Douglas-fir damaged by wind, snow and ice during the winter of 1996-97.

The Douglas-fir beetle prefers larger diameter, mature trees (Schmitz and Gibson 1996, Flanagan 1998) and the results of sampling completed on the IPNFs indicate an average diameter of attacked trees of 18.5 inches (Kegley et al. 1999). The effects and extent of this outbreak were exacerbated by hot and dry weather during 1998. Over 85 percent of the trees attacked by the beetles are dead or dying (Kegley et al. 1999).

Douglas-fir beetles are currently active across much of the National Forest lands in the Coeur d'Alene subbasin. The Douglas-fir beetle will create "openings" of varying sizes across the landscape. An "opening" is defined as a forest stand, group of stands or portion of a stand where bark beetles, in conjunction with other agents such as root disease and snow or ice damage, kill more than 50 percent of the existing stand. These openings may range from five to 100 acres in size. The larger openings are likely to appear as a mosaic, with individual live trees and groups of live trees, in an area where most other trees have been killed by the bark beetle, root disease or ice and snow damage. These openings will have irregular shapes and edges.

The Douglas-fir beetle tends to kill trees in groups because they release pheromones that attract other beetles to susceptible trees and cause mass attacks (Flanagan 1998). When trees are successfully attacked, the beetles release anti-aggregate pheromones, repelling incoming beetles which then attack adjacent trees. Due to the epidemic populations we are currently experiencing, these groups of attacked trees are coalescing to create larger openings in the forest canopy. On the Coeur d'Alene River District infested trees tend to occur in small groups of less than five acres in size, but in some areas most Douglas-fir has been attacked and killed in areas up to 100 acres in size.

1998 was probably the peak year of the beetle epidemic but additional mortality is expected over the next two years (Flanagan 1998).

Existing Condition

Methodology

The information provided below comes from a variety of sources. The extent and location of current bark beetle infestations were based on aerial insect detection flights conducted in late summer of 1998 and field surveys (Coeur d'Alene River RD 1998) of sites with active beetle populations. The extent of bark beetle activity that is projected to occur over the next several years is based on information from area entomologists and scientific studies (Kegley 1998 and Flanagan 1998). Locations of projected bark beetle activity are based on current infestations and a hazard analysis of stands within the project area. Information for National Forest lands on habitat types, forest cover types, forest structural stage and past harvest activity are based on existing data bases (Timber Stand Management Record System, TSMRS) that were developed from stand exam information, historical records and aerial photo interpretation. Maps of forest cover types, habitat types and past harvest activity are available in the project file.

Based on aerial detection flights and field surveys (Coeur d'Alene River RD 1998), there are currently about 15,000 acres that have mortality caused by Douglas-fir beetle within the six analysis areas. There may have been some areas where affected trees were not yet showing symptoms and were therefore not mapped during the flight.

The structural stage categories listed in the tables below are quite broad and are based on stand age. The shrub/seedling/sapling stage includes forest stands that are less than 35 years old. These stands have resulted from past regeneration harvests or natural event such as fire. These stands may consist of seedlings less than one year old or trees planted in clearcuts in the 1960s that are now over 30 feet tall. Some stands

may retain a considerable number of overstory trees for shelterwood purposes, while others may have no large tree component.

The pole and small-to-medium timber structural stage consists of stands that are 36 to 100 years old. These stands may represent natural regeneration left after selective removal of the large, valuable overstory trees or may have resulted from fires or timber harvest in the early part of this century. Many of these stands are quite dense with high stocking levels; some are rather open, particularly where commercial thinning harvests or thinning from root disease has taken place.

The mature, large timber structural stage includes stands of trees that are 100 to 150 years old. These stands generally resulted from fires prior to 1900 and are quite varied in appearance. Stand conditions may be quite open as a result of past harvest activity, root disease, fire or soil conditions. Stands unaffected by these events will be dense with fairly closed canopies.

The old forest structure includes stands of trees that are over 150 years old that resulted from fires or other natural disturbance prior to 1850. These areas have often been highly fragmented by past regeneration harvests, and existing stands will vary in composition and canopy closure based on past harvest activity, root disease, fire or soil conditions.

There is very little detailed information on areas harvested prior to the 1950s. Therefore, the tables do not include acres harvested prior to this time. Also, many areas have had more than one harvest entry, particularly commercial thinning and sanitation/salvage harvests.

Information on other ownership lands within the project area is limited. Private lands tend to have more of the drier habitat types because they are generally lower in elevation and receive less moisture. Although regeneration harvests have created openings in the forest canopy, existing openings are mostly a result of permanent land clearing for homes and pastures. Timber harvests on private lands often tend to be selective removal of trees of highest economic value (usually the largest), and natural regeneration is relied on to fill in any created openings. This tends to favor shade-tolerant Douglas-fir and grand fir over early seral species such as pine and larch and typically removes any old forest structure. Douglas-fir beetles are active on other ownerships within the analysis areas wherever Douglas-fir of sufficient size and density are present.

Hayden Analysis Area

The Hayden analysis area encompasses approximately 41,400 acres, of which about 26,000 acres is National Forest land. The remainder includes Hayden Lake (3,850 acres) and approximately 11,550 acres of land in other ownership.

National Forest lands within this analysis area are dominated by warm, moist habitat types of western hemlock and grand fir with some western red cedar. About 77 percent (20,100 acres) of the area is in these habitat types. However, warm, dry Douglas-fir and grand fir habitat types comprise about 5,200 acres, occurring mainly on southeast through west slopes at lower elevations. Cool, wet western redcedar habitat types occur on about 550 acres along streams and adjacent riparian areas. There are also some cool, dry subalpine fir habitat types at the higher elevations near Chilco Peak, but these are found on fewer than 150 acres.

Douglas-fir and grand fir are the dominant forest cover types on 83 percent of the analysis area. Western hemlock is the dominant species on only eight percent of the area, followed by ponderosa pine, larch and cedar at two percent each. Lodgepole pine, subalpine fir and white pine cover types each occupy one percent or less of the area.

Most (78 percent) of this analysis area is in the pole and small-to-medium saw timber structural stage in stands that are 35-100 years old. Approximately 18 percent of the analysis area is 100-150 years old, and less

than one percent of the area is over 150 years old. There are only 143 acres of allocated old growth and 373 acres of recruitment old growth within the analysis area, most (89 percent) of which is on moist western hemlock and grand fir habitat types. Grand fir and Douglas-fir are the dominant species in 82 percent of the old growth stands.

Because most of this area did not burn in the large fires of the late 19th and early 20th centuries, large white pine was likely abundant on the wetter habitat types. This would have attracted the logging industry in the first half of this century. A logging railroad was extended through the area in 1923 to access timber in the Burnt Cabin drainage (Strong and Webb 1970), but most of the analysis area may have been harvested prior to the construction of this railroad since access was relatively easy. These early harvests were generally quite selective, removing only the large pine and larch and leaving stands of poor quality Douglas-fir, grand fir and hemlock.

More intensive management began in the 1960s, but only a small percentage of the area has been treated with regeneration harvests. The most recent harvests occurred in 1998 and 1999, with approximately 600 acres being salvage harvested as a result of severe ice and snow damage that occurred during the winter of 1996-97. There have been no fires in recent history that would have altered stand structure, although there have been many small lightning fires.

About 4,600 acres of National Forest lands within the Hayden analysis area have beetle-caused mortality.

Table III-2. Vegetative conditions in the Hayden area.

Habitat Type Group	Approximate Acres	%of Forest Lands
Warm/Dry (Groups 1,2,3)	5,200	20
Warm/Moist (Groups 4, 5, and 6)	20,100	77
Cool/Moist (Groups 7 and 8)	550	2
Cool/Dry (Groups 9 and 10)	150	1
Forest Cover Types	**Approximate Acres**	**% of Forest Lands**
Douglas-fir	12,100	47
Grand fir	9,300	36
Western Hemlock	2,200	8
Ponderosa Pine	600	2
Western Larch	450	2
Western Redcedar	650	3
Lodgepole Pine	300	1
Subalpine fir	200	1
Western White Pine	100	0.5
Non Forest	100	0.5
Structural Stage	**Approximate Acres**	**% of Forest Lands**
Shrubs/Seedlings/Saplings	875	3
Poles/small-medium timber	20,200	78
Mature/large timber	4,750	18
Old Forest	175	1
Allocated old growth	143	0.5
Recruitment old growth	373	1.4
Past Timber Harvest and Fires	**Approximate Acres**	**% of Forest Lands**
Clearcuts	554	2
Seed Tree & Shelterwood	271	1
Overstory Removal	835	3
Sanitation/Salvage	1,626*	6*
Commercial Thinning	2,481*	9*
Selection Harvest	276	1
Fires since 1950	0	0

* *These areas have been harvested several times so actual acreage impacted is considerably less.*

Coeur d'Alene Lake Analysis Area

For analysis purposes, this analysis area has been divided into eight watershed areas: Nettleton Gulch, Fernan Creek, Wolf Lodge Creek, Cedar Creek, Fourth of July Creek, Beauty Creek, Carlin Creek, and "Other Coeur d'Alene Watersheds."

Nettleton Gulch Watershed

The Nettleton Gulch area encompasses approximately 1,550 acres, of which about 1525 acres is National Forest land.

National Forest Lands within this watershed are fairly evenly split between warm, dry and warm, moist habitat types. Fifty two percent of the area is in dry habitat types and 48 percent in moist habitat types.

Douglas-fir and grand fir are the dominant forest cover types within the watershed, accounting for 84 percent of the forested land. Ponderosa pine is the dominant species on 15 percent of the area and cedar, larch and white pine account for the remainder.

Most (56 percent) of this watershed is in the pole and small-to-medium saw timber structural stage in stands that are 35-100 years old. Approximately 38 percent of the watershed is 100-150 years old and about 6 percent is less than 35 years old. No stands were identified that are over 150 years old but there are 83 acres of recruitment old growth within the watershed.

Much of this watershed was harvested early in the century due to its close proximity to Coeur d'Alene. These early harvests were generally quite selective, removing only the large pine and larch and leaving stands of poor quality Douglas-fir, grand fir, and hemlock.

More intensive management began in the 1960s with approximately 20 percent of the area having been treated with regeneration harvests. The most recent harvests occurred in 1998 and 1999 with approximately 160 acres currently being salvage harvested as a result of severe ice and snow damage that occurred during the winter of 1996-97. There have been no fires in recent history that would have altered stand structure, although there have been many small lightning fires.

There are only about 25 acres of private lands within the analysis. These dry habitat lands have been previously harvested, probably several times. Douglas-fir beetles are active in stands that still contain larger diameter Douglas-fir.

There are approximately 350 acres of National Forest lands within the Nettleton Gulch watershed that have beetle caused mortality.

Table III-3. Vegetative conditions in the Nettleton Gulch watershed, Coeur d'Alene Lake analysis area.

Habitat Type Group	**Approximate Acres**	**% of Forest Lands**
Warm/Dry (Groups 1,2,3)	790	52
Warm/Moist (Groups 4 and 5)	735	48
Forest Cover Types	**Approximate Acres**	**% of Forest Lands**
Douglas-fir	1,050	69
Grand fir	225	15
Ponderosa Pine	225	15
Other Species	25	1
Structural Stage	**Approximate Acres**	**% of Forest Lands**
Shrubs/Seedlings/Saplings	100	6
Poles/small-medium timber	850	56
Mature/large timber	575	38
Old Forest	0	0
Allocated old growth	0	0
Recruitment old growth	83	5
Past Timber Harvest and Fires	**Approximate Acres**	**% of Forest Lands**
Clearcuts	0	0
Seed Tree & Shelterwood	100	6
Overstory Removal	0	0
Sanitation/Salvage	535*	35*
Commercial Thinning	0	0
Selection Harvest	222	14
Fires since 1950	0	0

* *These areas have been harvested several times so actual acreage impacted is considerably less.*

Fernan Creek Watershed

The Fernan area encompasses approximately 11,650 acres, of which about 7,450 acres is National Forest land. The remainder includes approximately 4,200 acres of lands in other ownership.

National Forest lands within this watershed are dominated by warm, moist habitat types of western hemlock and grand fir, with some western redcedar. About 80 percent (5,950 acres) of the area is in these moist habitat types. However, warm, dry Douglas-fir and grand fir habitat types comprise a substantial proportion (20 percent) of the area, occurring mainly on southeast through west slopes at lower elevations.

Douglas-fir and grand fir are the dominant forest cover types within the watershed, accounting for 83 percent of the forested land. Western hemlock, larch, white pine, ponderosa pine, and cedar account for the remainder.

Most (63 percent) of this watershed is in the pole and small-to-medium saw timber structural stage in stands that are 35-100 years old. Approximately 24 percent of the watershed is 100-150 years old and less than one percent of the area is over 150 years old. There are only 30 acres of allocated old growth and 10 acres of recruitment old growth within the watershed. All of the allocated old growth is on dry Douglas-fir habitat types with Douglas-fir the major species, while the recruitment old growth is on moist habitat types with grand fir the major species.

Much of this watershed was harvested early in the century due to its close proximity to Coeur d'Alene. These early harvests were generally quite selective, removing only the large pine and larch and leaving stands of poor-quality Douglas-fir, grand fir, and hemlock.

More intensive management began in the 1960s, with approximately 16 percent of the area having been treated with regeneration harvests. The most recent harvests occurred in 1998 and 1999, with approximately 300 acres being salvage harvested as a result of severe ice and snow damage that occurred during the winter of 1996-97. There have been no fires in recent history that would have altered stand structure, although there have been many small lightning fires.

Much of the private land has been permanently cleared for pasture, particularly in the bottom lands along Fernan Creek. The steeper slopes along Fernan Lake have fairly heavy beetle activity.

There are approximately 1,300 acres of National Forest lands within the Fernan watershed that have beetle-caused mortality.

Table III-4. Vegetative conditions in the Fernan watershed, Coeur d'Alene Lake analysis area.

Habitat Type Group	**Approximate Acres**	**% of Forest Lands**
Warm/Dry (Groups 1,2,3)	1500	20
Warm/Moist (Groups 4 and 5)	5950	80
Forest Cover Types	**Approximate Acres**	**% of Forest Lands**
Douglas-fir	4,225	57
Grand fir	1,950	26
Western Hemlock	325	4
Ponderosa Pine	200	3
Western Larch	325	4
Western Redcedar	125	2
Western White Pine	300	4
Structural Stage	**Approximate Acres**	**% of Forest Lands**
Shrubs/Seedlings/Saplings	920	12
Poles/small-medium timber	4,670	63
Mature/large timber	1,800	24
Old Forest	60	1
Allocated old growth	30	0.4
Recruitment old growth	10	0.1
Past Timber Harvest and Fires	**Approximate Acres**	**% of Forest Lands**
Clearcuts	600	8
Seed Tree & Shelterwood	336	5
Overstory Removal	53	1
Sanitation/Salvage	1,153*	6*
Commercial Thinning	556	8*
Selection Harvest	252	3
Fires since 1950	0	0

** These areas have been harvested several times so actual acreage impacted is considerably less.*

Wolf Lodge Creek Watershed

The Wolf Lodge watershed encompasses approximately 29,275 acres of which about 23,300 acres is National Forest land. The remainder includes approximately 5,975 acres of lands in other ownership.

Approximately 89 percent of National Forest lands within this watershed are dominated by warm, moist habitat types of western hemlock and grand fir with some western redcedar. Douglas-fir and grand fir are the dominant forest cover types within the watershed, accounting for 78 percent of the forested land.

Most (56 percent) of this watershed is in the mature and large saw timber structural stage in stands that are 100-150 years old. A major proportion, approximately 34 percent, is 35-100 years old, and less than two percent of the area is over 150 years old. There are approximately 2,294 acres of allocated old growth and 874 acres of recruitment old growth within the watershed.

There are few records of early harvesting in the Wolf Lodge Creek watershed, but cedar was probably removed from the bottom lands and white pine and larch harvested from the uplands early in this century. More intensive management began in the 1960s. Approximately 14 percent of the area has been treated with regeneration harvests. The most recent harvests have been associated with the Horizon Sun Timber Sale, which is currently active. There have been no fires in recent history that would have altered stand structure, although there have been many small lightning fires.

Much of the private land has been permanently cleared for pasture, particularly in the bottom lands along Wolf Lodge Creek, Marie Creek and Stella Creek.

There are approximately 1,400 acres of National Forest lands within the Wolf Lodge watershed that have beetle-caused mortality.

Table III-5. Vegetative conditions in the Wolf Lodge watershed, Coeur d'Alene Lake analysis area.

Habitat Type Group	**Approximate Acres**	**% of Forest Lands**
Warm/Dry (Groups 1,2,3)	1,850	8
Warm/Moist (Groups 4, 5, and 6)	20,650	89
Cool/Moist (Groups 7 and 8)	200	1
Cool/Dry (Groups 9 and 10)	600	2
Forest Cover Types	**Approximate Acres**	**% of Forest Lands**
Douglas-fir	10,100	44
Grand fir	7,825	34
Western Hemlock	800	3
Ponderosa Pine	1,400	6
Western Larch	975	4
Western Redcedar	100	.5
Lodgepole Pine	350	1.5
Subalpine Fir	950	4
Western White Pine	800	3
Structural Stage	**Approximate Acres**	**% of Forest Lands**
Shrubs/Seedlings/Saplings	1,950	8
Poles/small-medium timber	7,975	34
Mature/large timber	12,925	56
Old Forest	450	2
Allocated old growth	2,294	10
Recruitment old growth	874	4
Past Timber Harvest and Fires	**Approximate Acres**	**% of Forest Lands**
Clearcuts	1,668	7
Seed Tree & Shelterwood	1,346	6
Overstory Removal	669	3
Sanitation/Salvage	1,855*	8*
Commercial Thinning	1,352*	6*
Selection Harvest	343	1
Fires since 1950	0	0

* *These areas have been harvested several times so actual acreage impacted is considerably less.*

Cedar Creek Watershed

The Cedar Creek watershed encompasses approximately 10,050 acres, of which about 9,000 acres is National Forest land. The remainder includes approximately 1,050 acres of lands in other ownership.

National Forest lands within this watershed are dominated by warm, moist habitat types (94 percent) of western hemlock and grand fir, with some western redcedar.

Grand fir is the dominant forest cover type, followed by Douglas-fir and cedar. Western hemlock, larch and ponderosa pine account for the remainder.

Mature and large timber stands that are 100-150 years old are the dominant structural stage (46 percent), but a substantial portion is also in poles and small-to-medium timber and in shrubs, seedlings and saplings. Approximately 32 percent of the watershed is 35-100 years old, and less than one percent of the area is over 150 years old. There are 287 acres of allocated old growth and 886 acres of recruitment old growth within the watershed.

Although there are few records, most of Cedar Creek was harvested early in the century. These harvests were probably quite selective in nature, removing only the largest and best cedar, white pine and larch.

More intensive management began in the 1960s. Approximately 25 percent of the area has been treated with regeneration harvests. The most recent harvests have been salvage harvests associated with ice storm damage. There have been no fires in recent history that would have altered stand structure, although there have been many small lightning fires.

There are approximately 1,000 acres of National Forest lands within the Cedar Creek watershed that have beetle-caused mortality.

Table III-6. Vegetative conditions in the Cedar Creek watershed, Coeur d'Alene Lake analysis area.

Habitat Type Group	**Approximate Acres**	**% of Forest Lands**
Warm/Dry (Groups 1,2,3)	550	6
Warm/Moist (Groups 4 and 5)	8,450	94
Forest Cover Types	**Approximate Acres**	**% of Forest Lands**
Douglas-fir	2,875	32
Grand fir	3,625	40
Western Hemlock	350	4
Ponderosa Pine	325	4
Western Larch	400	4
Western Redcedar	1,425	16
Structural Stage	**Approximate Acres**	**% of Forest Lands**
Shrubs/Seedlings/Saplings	1,900	21
Poles/small-medium timber	2,850	32
Mature/large timber	4,125	46
Old forest	125	1
Allocated old growth	287	3
Recruitment old growth	886	10
Past Timber Harvest and Fires	**Approximate Acres**	**% of Forest Lands**
Clearcuts	747	8
Seed Tree & Shelterwood	978	11
Overstory Removal	65	1
Sanitation/Salvage	1,638*	18*
Commercial Thinning	2,289*	25*
Selection Harvest	534	6
Fires since 1950	0	0

** These areas have been harvested several times so actual acreage impacted is considerably less.*

Fourth of July Creek Watershed

The Fourth of July Creek watershed encompasses approximately 13,475 acres, of which about 8,875 acres is National Forest land. The remainder includes approximately 4,600 acres of lands in other ownership.

National Forest lands within this watershed are dominated by warm, moist habitat types (84 percent) of western hemlock and grand fir, with some western redcedar. Approximately 16 percent of the area consists of warm, dry habitat types.

Douglas-fir and grand fir are the dominant forest cover types, accounting for 67 percent of the area. Western redcedar follows with 13 percent, with western hemlock, ponderosa pine, white pine and larch accounting for the remainder.

Poles and small-to-medium timber stands that are 35-100 years old are the dominant structural stage (74 percent), with 14 percent in mature structure and 11 percent in shrubs, seedlings and saplings. Approximately one percent of the area is in old forest structure. There are 80 acres of allocated old growth and 401 acres of recruitment old growth within the watershed.

Although there are few records, most of Fourth of July Creek was harvested early in the century. These harvests were probably quite selective in nature, removing only the largest and best cedar, white pine and larch. Cedar was probably removed from riparian areas quite early during Euro-settlement. More intensive management began in the 1960s. Approximately 14 percent of the area has been treated with regeneration harvests. The most recent harvests have been regeneration harvests with the Millrose Curran and Crinkle Kut Timber Sales and some salvage harvests associated with ice storm damage. There have been no fires in recent history that would have altered stand structure, although there have been many small lightning fires.

There are approximately 500 acres of National Forest lands within the Fourth of July Creek watershed that have beetle-caused mortality.

Table III-7. Vegetative conditions in Fourth of July Creek watershed, Coeur d'Alene Lake analysis area.

Habitat Type Group	**Approximate Acres**	**% of Forest Lands**
Warm/Dry (Groups 1,2,3)	1,400	16
Warm/Moist (Groups 4 and 5)	7,475	84
Forest Cover Types	**Approximate Acres**	**% of Forest Lands**
Douglas-fir	3,375	38
Grand fir	2,575	29
Western Hemlock	650	7
Ponderosa Pine	400	5
Western Larch	275	3
Western Redcedar	1,200	13
Western White Pine	400	5
Structural Stage	**Approximate Acres**	**% of Forest Lands**
Shrubs/Seedlings/Saplings	950	11
Poles/small-medium timber	6,600	74
Mature/large timber	1,200	14
Old forest	125	1
Allocated old growth	80	1
Recruitment old growth	401	4
Past Timber Harvest and Fires	**Approximate Acres**	**% of Forest Lands**
Clearcuts	405	4
Seed Tree & Shelterwood	753	8
Overstory Removal	102	1
Sanitation/Salvage	705	8*
Commercial Thinning	11*	0*
Selection Harvest	152	2
Fires since 1950	0	0

* *These areas have been harvested several times so actual acreage impacted is considerably less.*

Beauty Creek Watershed

The Beauty Creek watershed encompasses approximately 7,025 acres, of which about 6,750 acres is National Forest land. The remainder includes approximately 275 acres of lands in other ownership.

National Forest lands within this watershed are dominated by warm, moist habitat types (77 percent) of western hemlock and grand fir, with some western redcedar; warm, dry Douglas-fir and grand fir habitat types cover a substantial portion (19 percent) of the area.

Douglas-fir and grand fir are the dominant forest cover types, accounting for 87 percent of the forested land. Western hemlock, larch and cedar account for the remainder, with a few stands of other species.

Most (57 percent) of this watershed is in the pole and small-to-medium saw timber structural stage in stands that are 35-100 years old, but a substantial portion is also in mature and large saw timber. Only two percent is in old forest structure and only eight percent is shrubs, seedlings, or saplings. There are 184 acres of allocated old growth and 197 acres of recruitment old growth within the watershed.

Intensive forest management in the Beauty Creek watershed began in the 1960s. Approximately 14 percent of the area has been treated with regeneration harvests. The most recent harvests have been commercial thinnings and some minor salvage. There have been no fires in recent history that would have altered stand structure, although there have been many small lightning fires.

There are approximately 850 acres of National Forest lands within the Beauty watershed that have beetle-caused mortality.

Table III-8. Vegetative conditions in the Beauty Creek watershed, Coeur d'Alene Lake analysis area.

Habitat Type Group	**Approximate Acres**	**% of Forest Lands**
Warm/Dry (Groups 1,2,3)	1,300	19
Warm/Moist (Groups 4. 5, and 6)	5,225	77
Cool/Moist (Groups 7 and 8)	225	4
Forest Cover Types	**Approximate Acres**	**% of Forest Lands**
Douglas-fir	3,100	46
Grand fir	2,750	41
Western Hemlock	300	4
Western Redcedar	250	4
Western Larch	250	4
All Others	100	1
Structural Stage	**Approximate Acres**	**% of Forest Lands**
Shrubs/Seedlings/Saplings	525	8
Poles/small-medium timber	3,850	57
Mature/large timber	2,250	33
Old Forest	125	2
Allocated Old growth	184	3
Recruitment Old growth	197	3
Past Timber Harvest and Fires	**Approximate Acres**	**% of Forest Lands**
Clearcuts	67	1
Seed Tree & Shelterwood	723	11
Overstory Removal	977	14
Sanitation/Salvage	385	6
Commercial Thinning	256	4
Selection Harvest	121	2
Fires since 1950	0	0

Carlin Creek Watershed

The Carlin Creek watershed encompasses approximately 7,650 acres, of which about 4,200 acres is National Forest land. The remainder includes approximately 3,450 acres of lands in other ownership.

National Forest lands within this watershed are dominated by warm, moist habitat types of western hemlock and grand fir, with some western redcedar; warm, dry Douglas-fir and grand fir habitat types cover a major portion of the area.

Douglas-fir and grand fir are the dominant forest cover types, accounting for 74 percent of the forested land. Ponderosa pine is the dominant tree on 13 percent of the area and larch, cedar, white pine and hemlock account for the remainder.

Most (73 percent) of this watershed is in the pole and small-to-medium saw timber structural stage in stands that are 35-100 years old. There are no stands that have been identified as being in old forest structure, and there is no allocated or recruitment old growth.

Intensive forest management in the Carlin Creek watershed began in the 1970s. Approximately 25 percent of the area has been treated with regeneration harvests. The most recent harvests have been sanitation/salvage harvests that resulted from ice and snow damage during the winter of 1996-97 and seed tree and shelterwood harvest associated with the Happy Hog Timber Sale, which is currently active. There have been no fires in recent history that would have altered stand structure, although there have been many small lightning fires.

There are approximately 900 acres of National Forest lands within the Carlin watershed that have beetle-caused mortality.

Table III-9. Vegetative conditions in the Carlin Creek watershed, Coeur d'Alene Lake analysis area.

Habitat Type Group	**Approximate Acres**	**% of Forest Lands**
Warm/Dry (Groups 1,2,3)	850	20
Warm/Moist (Groups 4, 5, and 6)	2,825	77
Cool/Moist (Groups 7 and 8)	525	4
Forest Cover Types	**Approximate Acres**	**% of Forest Lands**
Douglas-fir	2,200	53
Grand fir	900	21
Western Hemlock	50	1
Western Redcedar	200	5
Western Larch	200	5
Ponderosa Pine	550	13
White Pine	100	2
Structural Stage	**Approximate Acres**	**% of Forest Lands**
Shrubs/Seedlings/Saplings	450	11
Poles/small-medium timber	3,000	73
Mature/large timber	650	16
Old forest	0	0
Allocated old growth	0	0
Recruitment old growth	0	0
Past Timber Harvest and Fires	**Approximate Acres**	**% of Forest Lands**
Clearcuts	360	8
Seed Tree & Shelterwood	396	9
Overstory Removal	52	1
Sanitation/Salvage	512	12
Commercial Thinning	543	13
Selection Harvest	341	8
Fires since 1950	0	0

Other Coeur d'Alene Watersheds

The Other Coeur d'Alene watersheds include Blue Creek drainage, Turner Creek drainage and several face drainages flowing into Lake Coeur d'Alene. These watersheds encompasses approximately 36,600 acres, of which about 4,300 acres is National Forest land. The remainder includes approximately 32,300 acres of lands in other ownership.

These watersheds represent face drainages that are too small to analyze separately or were deemed appropriate to group together for analysis purposes. National Forest lands within these watersheds are dominated by warm, moist habitat types of western hemlock and grand fir, with some western redcedar; warm, dry Douglas-fir and grand fir habitat types cover a major portion of the area. Moist habitats comprise 67 percent and dry habitats 33 percent of the area.

Douglas-fir and grand fir are the dominant forest cover types, accounting for 79 percent of the forested land. Western redcedar, ponderosa pine and larch account for the remainder with a few stands of other species.

Most (63 percent) of this watershed is in the pole and small-to-medium saw timber structural stage in stands that are 35-100 years old, but a substantial portion (18 percent) is also in mature and large saw timber. Only three percent is in old forest structure and 16 percent is shrubs, seedlings, or saplings. There are 77 acres of allocated old growth and 178 acres of recruitment old growth within the watersheds.

Intensive forest management in these watersheds generally began in the 1960s. Approximately 25 percent of the area has been treated with regeneration harvests. The most recent harvests have been salvage treatments associated with ice and snow damage. There have been no fires in recent history that would have altered stand structure, although there have been many small lightning fires.

Some private lands have been permanently cleared for pasture and there are numerous homesites in the area, particularly along Coeur d'Alene Lake.

There are approximately 250 acres of National Forest lands within these watersheds that have beetle-caused mortality.

Table III-10. Vegetative conditions in other watersheds, Coeur d'Alene Lake analysis area.

Habitat Type Group	**Approximate Acres**	**% of Forest Lands**
Warm/Dry (Groups 1,2,3)	1,400	33
Warm/Moist (Groups 4, 5, and 6)	2,900	67
Forest Cover Types	**Approximate Acres**	**% of Forest Lands**
Douglas-fir	1,800	41
Grand fir	1,625	38
Western Redcedar	425	10
Western Larch	250	6
Ponderosa Pine	150	3
Western White Pine	25	1
Non Forest	25	1
Structural Stage	**Approximate Acres**	**% of Forest Lands**
Shrubs/Seedlings/Saplings	675	16
Poles/small-medium timber	2,725	63
Mature/large timber	775	18
Old forest	125	3
Allocated old growth	77	2
Recruitment old growth	178	4
Past Timber Harvest and Fires	**Approximate Acres**	**% of Forest Lands**
Clearcuts	338	8
Seed Tree & Shelterwood	536	12
Overstory Removal	340	8
Sanitation/Salvage	277	6
Commercial Thinning	954	22
Selection Harvest	232	5
Fires since 1950	0	0

Chain Lakes Analysis Area

The Chain Lakes analysis area encompasses approximately 56,225 acres, of which about 17,400 acres is National Forest land. The remainder includes approximately 38,825 acres of lands in other ownership.

The major drainages in this analysis area include Rose Creek, Killarney Creek, Fortier Creek, Thompson Creek and Blue Lake Creek. National Forest lands within these watersheds are dominated by warm, moist habitat types of western hemlock and grand fir, with some western redcedar; warm, dry Douglas-fir and grand fir habitat types cover a major portion (27 percent) of the area.

Douglas-fir and grand fir are the dominant forest cover types accounting for 76 percent of the forested land. Cedar, western hemlock, larch, ponderosa pine and white pine account for the remainder.

Most (57 percent) of this analysis area is in the pole and small-to-medium saw timber structural stage in stands that are 35-100 years old, but a substantial portion (30 percent) is also in mature and large saw timber. Only five percent is in old forest structure and only eight percent is shrubs, seedlings, or saplings. There are 621 acres of allocated old growth and 788 acres of recruitment old growth within the watershed.

Intensive forest management in the Chain Lakes watersheds began in the 1960s. Approximately 15 percent of the area has been treated with regeneration harvests. The most recent harvests have been regeneration harvests associated with the Millrose Curran and Crinkle Kut Timber Sales. There have been no fires in recent history that would have altered stand structure, although there have been many small lightning fires.

Some private lands have been permanently cleared for pasture and there are numerous homesites in the area, particularly along the Coeur d'Alene River.

There are approximately 2,600 acres of National Forest lands within the Chain Lakes analysis area that have beetle-caused mortality.

Table III-11. Vegetative conditions in the Chain Lakes analysis area.

Habitat Type Group	**Approximate Acres**	**% of Forest Lands**
Warm/Dry (Groups 1,2,3)	4,650	27
Warm/Moist (Groups 4, 5, and 6)	12,750	73
Forest Cover Types	**Approximate Acres**	**% of Forest Lands**
Douglas-fir	7,425	43
Grand fir	5,800	33
Western Hemlock	1,050	6
Western Redcedar	1,400	8
Western Larch	550	3
Ponderosa Pine	500	3
Western White Pine	350	2
Non Forest	325	2
Structural Stage	**Approximate Acres**	**% of Forest Lands**
Shrubs/Seedlings/Saplings	1,425	8
Poles/small-medium timber	9,950	57
Mature/large timber	5,225	30
Old Forest	800	5
Allocated Old growth	621	4
Recruitment Old growth	788	5
Past Timber Harvest and Fires	**Approximate Acres**	**% of Forest Lands**
Clearcuts	489	3
Seed Tree & Shelterwood	2,121	12
Overstory Removal	254	1
Sanitation/Salvage	417	2
Commercial Thinning	436	2
Selection Harvest	1,143	6
Fires since 1950	0	0

Steamboat Analysis Area

The Steamboat analysis area encompasses approximately 8,800 acres, all of which are National Forest lands.

This analysis area is dominated by warm, moist habitat types of western hemlock and grand fir, with some western redcedar.

Douglas-fir and grand fir are the dominant forest cover types, accounting for 67 percent of the forested land. Western hemlock is the dominant species on 11 percent of the area and lodgepole pine is the major species on 10 percent. Larch, cedar, ponderosa pine, cottonwood, subalpine fir and white pine account for the remainder.

Most of this analysis area is in the pole and small-to-medium saw timber or mature and large timber structural stage in stands that are 35-150 years old. About 10 percent of the area has been identified as being in old forest structure. There are 369 acres of allocated old growth within the analysis area.

Intensive forest management in the Steamboat analysis area began in the 1950s, but there are records of harvests as early as the 1900s. Approximately 11 percent of the area has been treated with regeneration harvests. The most recent harvests were regeneration treatments completed in the early 1990s. There have been no fires in recent history that would have altered stand structure, although there have been many small lightning fires.

There are approximately 60 acres of National Forest lands within the Steamboat analysis area that have beetle-caused mortality.

Table III-12. Vegetative conditions in the Steamboat analysis area.

Habitat Type Group	**Approximate Acres**	**% of Forest Lands**
Warm/Dry (Groups 1,2,3)	1,200	14
Warm/Moist (Groups 4, 5, and 6)	6,875	78
Cool/Moist (Groups 7 and 8)	600	7
Cool/Dry (Groups 9 and 10)	125	1
Forest Cover Types	**Approximate Acres**	**% of Forest Lands**
Douglas-fir	3,300	38
Grand fir	2,550	29
Western Hemlock	1,000	11
Western Redcedar	25	0
Subalpine Fir	150	2
Ponderosa Pine	100	1
Cottonwood	225	2
Lodgepole	850	10
White Pine	425	5
Non Forest	175	2
Structural Stage	**Approximate Acres**	**% of Forest Lands**
Shrubs/Seedlings/Saplings	1,025	12
Poles/small-medium timber	3,500	40
Mature/large timber	3,500	40
Old Forest	775	9
Allocated old growth	369	4
Recruitment old growth	0	0
Past Timber Harvest and Fires	**Approximate Acres**	**% of Forest Lands**
Clearcuts	898	10
Seed Tree & Shelterwood	68	1
Overstory Removal	113	1
Sanitation/Salvage	2,860*	32*
Commercial Thinning	18	0
Selection Harvest	0	0
Fires since 1950	0	0

** These areas have been harvested several times so actual acreage impacted is considerably less.*

Bumblebee Analysis Area

The Bumblebee analysis area encompasses approximately 14,125 acres, of which about 13,125 acres are National Forest lands. The remainder includes approximately 1,000 acres of lands in other ownership.

Warm, moist habitat types of western hemlock and grand fir, with some western redcedar cover 95 percent of this analysis area, while warm, dry habitat types are found on only five percent of the area.

Grand fir and Douglas-fir are the dominant forest cover types, accounting for 78 percent of the forested land. Western hemlock is the dominant species on nine percent of the area; larch, cedar, ponderosa pine, cottonwood, lodgepole pine and white pine account for the remainder.

Most of this watershed is in the pole and small-to-medium saw timber or mature and large timber structural stage in stands that are 35-150 years old. Six percent of the area has been identified as being in old forest structure. There are only 3 acres of allocated old growth, but there are 280 acres of recruitment old growth within the analysis area.

Intensive forest management in the Bumblebee analysis area began in the 1960s, but there are records of harvests as early as the 1930s. It is likely that earlier harvest removed trees, particularly cedar and white pine, along the North Fork of the Coeur d'Alene River. Approximately 17 percent of the area has been treated with regeneration harvests. The most recent harvests were regeneration cuts completed in the early 1990s. There have been no fires in recent history that would have altered stand structure, although there have been many small lightning fires.

There is little information on the private lands within the analysis area, but habitat types and forest cover types are expected to be similar to National Forest lands. Some private lands have been permanently cleared for pasture along the Coeur d'Alene River and there are some homesites in the area. Private land in Lightner Creek has been quite heavily harvested.

There are approximately 210 acres of National Forest lands within the Bumblebee analysis area that have beetle-caused mortality.

Table III-13. Vegetative conditions in the Bumblebee analysis area.

Habitat Type Group	**Approximate Acres**	**% of Forest Lands**
Warm/Dry (Groups 1,2,3)	625	5
Warm/Moist (Groups 4, 5, and 6)	12,500	95
Forest Cover Types	**Approximate Acres**	**% of Forest Lands**
Douglas-fir	2,875	22
Grand fir	7,350	56
Western Hemlock	1,150	9
Western Redcedar	500	4
Western Larch	375	3
Ponderosa Pine	100	1
Cottonwood	225	2
Lodgepole	225	2
White Pine	325	2
Structural Stage	**Approximate Acres**	**% of Forest Lands**
Shrubs/Seedlings/Saplings	2,050	16
Poles/small-medium timber	5,525	42
Mature/large timber	4,775	36
Old Forest	775	6
Allocated old growth	3	0
Recruitment old growth	280	2
Past Timber Harvest and Fires	**Approximate Acres**	**% of Forest Lands**
Clearcuts	1,895	14
Seed Tree & Shelterwood	336	3
Overstory Removal	232	2
Sanitation/Salvage	1,272*	10*
Commercial Thinning	127	1
Selection Harvest	54	0
Fires since 1950	0	0

** These areas have been harvested several times so actual acreage impacted is considerably less.*

Hart Analysis Area

For analysis purposes, this area has been described by two watershed areas: Hart Creek and Beaver Creek.

Hart Creek Area

The Hart Creek area encompasses approximately 16,450 acres, of which about 14,925 acres is National Forest land. The remainder includes approximately 1,525 acres of lands in other ownership.

The major watersheds within the Hart Creek area are Hart Creek, Rookie Creek, Hopkins Creek, Trouble Creek, Short Creek, Avery Creek and Clee Creek. There are also numerous unnamed face drainages flowing directly into the Coeur d'Alene River. Ninety percent of National Forest lands are warm, moist habitat types of western hemlock and grand fir, with some western redcedar.

Douglas-fir and grand fir are the dominant forest cover types, accounting for 70 percent of the forested land. Western hemlock is the dominant species on 16 percent of the area and lodgepole pine is the major species on four percent. Larch, cedar, cottonwood, white pine, and non forested areas account for the remainder. Most (68 percent) of this watershed is in the pole and small-to-medium saw timber structural stage in stands that are 35-100 years old. Approximately 11 percent of the area has been identified as being in old forest structure. There are 1,439 acres of allocated old growth within the watershed area.

Intensive forest management in the Hart Creek area began in the 1950s, but there are records of harvests as early as the 1900s. Most of this early harvest was to remove timber killed during the 1910 fire. Approximately six percent of the area has been treated with regeneration harvests. The Rookie Hart Salvage Sale is currently active within the area. This sale includes 47 acres of regeneration harvests. There have been no fires in recent history that would have altered stand structure, although there have been many small lightning fires.

There is little information on the private lands within the Hart Creek area, but habitat types and forest cover types are expected to be similar to National Forest lands. There are probably more cedar habitat types, since much of the private land lies along the Coeur d'Alene River. Some lands have been permanently cleared for pasture along the Coeur d'Alene River and there are many homesites along the river.

There are approximately 600 acres of National Forest lands within the Hart Creek area that have beetle-caused mortality.

Table III-14. Vegetative conditions in the Hart Creek watersheds, Hart analysis area.

Habitat Type Group	**Approximate Acres**	**% of Forest Lands**
Warm/Dry (Groups 1,2,3)	1,475	10
Warm/Moist (Groups 4, 5, and 6)	13,450	90
Forest Cover Types	**Approximate Acres**	**% of Forest Lands**
Douglas-fir	7,025	47
Grand fir	3,400	23
Western Hemlock	2,425	16
Western Redcedar	125	1
Western Larch	325	2
Cottonwood	300	2
Lodgepole	625	4
White Pine	200	1
Non Forest	500	3
Structural Stage	**Approximate Acres**	**% of Forest Lands**
Shrubs/Seedlings/Saplings	1,100	7
Poles/small-medium timber	10,100	68
Mature/large timber	2,050	14
Old forest	1,675	11
Allocated old growth	1,439	10
Recruitment old growth	0	0
Past Timber Harvest and Fires	**Approximate Acres**	**% of Forest Lands**
Clearcuts	838	6
Seed Tree & Shelterwood	28	0
Overstory Removal	1,371	9
Sanitation/Salvage	5,721*	38*
Commercial Thinning	22	0
Selection Harvest	4	0
Fires since 1950	0	0

* *These areas have been harvested several times so actual acreage impacted is considerably less.*

Beaver Creek Area

The Beaver Creek area encompasses approximately 3,225 acres, of which about 2,925 acres is National Forest land. The remainder includes approximately 300 acres of lands in other ownership.

The major watersheds within the Beaver Creek area are Trail and Beaver Creeks. Face drainages flowing directly into Beaver Creek include Shehee, Hutchins, Prospect and California Gulches. National Forest lands are dominated by warm, moist habitat types of western hemlock and grand fir, with some western redcedar.

Douglas-fir is the dominant forest cover type, accounting for 69 percent of the forested land. Grand fir is the dominant species on 16 percent of the area and ponderosa pine, larch, and white pine account for the remaining 15 percent.

Most (54 percent) of this area is in the mature and large timber structural stage in stands that are 100-150 years old. Pole-to-medium sawtimber structural stage covers 29 percent of the area, and almost 16 percent is in seedling and sapling sized stands. The latter are a result of regeneration harvests in the 1990s. Only one percent of the area has been identified as being in old forest structure. There are 248 acres of allocated old growth within the watershed area.

Intensive forest management in the Beaver Creek area began in the 1990s, but some harvesting has occurred since the 1960s. Approximately 15 percent of the area has been treated with regeneration harvests. The most recent harvests are regeneration treatments completed in the early 1990s as part of the King's Ridge Timber Sale. There have been no fires in recent history that would have altered stand structure, although there have been many small lightning fires.

There is little information on the private lands within the Beaver Creek area, but habitat types and forest cover types are expected to be similar to National Forest lands. There are probably more cedar habitat types, since much of the private land lies along Beaver Creek. Some lands have been permanently cleared for pasture along Beaver Creek and there are also some homesites along the creek.

There are approximately 525 acres of National Forest lands within the Beaver Creek area that have beetle-caused mortality.

Table III-15. Vegetative conditions in the Beaver Creek watersheds, Hart analysis area.

Habitat Type Group	Approximate Acres	% of Forest Lands
Warm/Dry (Groups 1,2,3)	500	17
Warm/Moist (Groups 4 and 5)	2,425	83
Forest Cover Types	**Approximate Acres**	**% of Forest Lands**
Douglas-fir	2,025	69
Grand fir	450	16
Ponderosa Pine	200	7
Western Larch	125	4
White Pine	125	4
Structural Stage	**Approximate Acres**	**% of Forest Lands**
Shrubs/Seedlings/Saplings	450	16
Poles/small-medium timber	850	29
Mature/large timber	1,600	54
Old Forest	25	1
Allocated old growth	248	5
Recruitment old growth	0	0
Past Timber Harvest and Fires	**Approximate Acres**	**% of Forest Lands**
Clearcuts	427	14
Seed Tree & Shelterwood	14	0
Overstory Removal	0	0
Sanitation/Salvage	77	3
Commercial Thinning	0	0
Selection Harvest	26	1
Fires since 1950	0	0

ENVIRONMENTAL CONSEQUENCES

Methodology

Refer to the tables in Appendix D for unit-by-unit descriptions of harvest prescriptions, logging systems and fuels treatments proposed under each alternative.

The Geographic Assessment for the Coeur d'Alene River Basin found that most watersheds within the project area were a high priority for vegetation restoration due to the effects of white pine blister rust, past harvest activities, and fire exclusion (IPNF, 1998). Species composition has changed dramatically from historical conditions with increases in Douglas-fir, grand fir and hemlock and corresponding reductions in the amount of white pine and larch.

Historic stand structures have also been altered. Old forest structure has been reduced below historic levels and stands have been fragmented by harvests or road construction. Remaining old growth is often lacking the component of large, old early seral remnants such as white pine and larch. Shrub/seedling/sapling structural stages tend to occur in smaller stands and are scattered over larger areas as a result of timber harvests. On drier sites, fire exclusion has allowed invasion by Douglas-fir and grand fir into stands historically dominated by ponderosa pine.

From a vegetation standpoint, the effects of the Douglas-fir beetle epidemic and resulting proposed harvest activities on species composition and stand structure will be used to determine environmental consequences.

Analysis of the action alternatives includes the effects of infestation, both in areas proposed for treatment and areas which would be untreated. In Alternative D, effects are shown for all stands that would be treated if they are now or should become infested (a portion of these stands is either lightly infested and not considered feasible for entry at this time or is projected to become infested with future beetle flights).

The reasonably foreseeable time frame for the beetle epidemic and activities associated with the action alternatives would be approximately five to seven years.

Direct, Indirect and Cumulative Effects at the Analysis Area Scale

Effects Common to All Alternatives

For all alternatives, the number of acres affected by Douglas-fir beetles will remain the same. The extent of bark beetle activity that is projected to occur over the next several years is based on information from area entomologists and scientific studies (Kegley 1998, Flanagan 1998).

Effects Common to All Action Alternatives

For all the action alternatives (B through G), proposed activities would not reduce the beetle populations. Locations of projected bark beetle activity are based on current infestations and a hazard analysis of stands within the project area. If bark beetle mortality is less than projected, some stands may not be entered or prescriptions may be modified from regeneration to selective harvest. This could reduce the acres of vegetation restoration that could be completed under any action alternative.

Although green trees would be removed in some stands for some alternatives, this would not create changes to the structural stage category beyond that caused by the bark beetles and associated mortality due to root disease and ice and snow breakage.

There are approximately 822 acres of allocated old growth and 420 acres of recruitment old growth that have a large component of Douglas-fir susceptible to bark beetle attack. These stands should be evaluated

following the beetle outbreak to determine if the impact of the beetles has been detrimental to old growth characteristics. Increases in the dead tree component may also enhance old growth characteristics. None of the Alternatives propose harvest or other activity within these or other allocated or recruitment old growth stands.

Some stands that contain old trees but do not have old growth characteristics would have harvest activities in some alternatives. In harvest units adjacent to allocated or recruitment old growth stands, maintenance of the integrity of the old growth would be designed into the harvest and subsequent treatments (see Features Common to All Action Alternatives, Chapter II).

At this time, there is no known literature displaying Douglas-fir beetle-infested timber which has been transported to milling facilities, causing further infestation. Although no literature exists, other species of beetles transported in timber to milling sites have been known to serve as a source for spread of beetle activity. In this Douglas-fir beetle infestation, most trees to be removed would be dead Douglas-fir trees from which the beetles have emerged prior to logging activities. This timber would cause no spread of Douglas-fir beetles. A lesser portion of the trees removed would be infested with beetles and larvae at the time of removal and would be transported to mill sites. Prior to the beetles' emergence from the timber, most logs would be processed (i.e. debarked), which would kill the beetle and larvae. If milling is not completed prior to emergence, the possibility of beetle spread could exist. Techniques such as water sprinklers set on log decks, using pheromone attractants in traps, and anti-attractants in susceptible stands surrounding mill sites could reduce the chance of beetles leaving the log processing plants.

Alternative A

There would be no harvest of trees killed by the Douglas-fir beetle under this alternative. Stands with a high component of large Douglas-fir (greater than 14 inches in diameter) are most susceptible to attack and are likely to lose the greatest number of trees (Lockman and Gibson 1998, Flanagan 1998). Douglas-fir mortality is likely to occur in groups as the pheromones synthesized by the beetles attract more beetles to the area. This leads to mass attacks where 60-80 percent of the large Douglas-fir can be killed (Flanagan 1998). Smaller diameter trees are also often attacked when they occur near these groups, especially in denser stands.

Douglas-fir beetle outbreaks typically last 3-4 years in this area, and current populations of the beetle are probably at their peak; however, there is likely to be considerable additional mortality within the next two years. Predictions for projected beetle-caused mortality are based on current levels of bark beetles within the watersheds, susceptibility of stands to bark beetle attack (amount of large Douglas-fir) and projected numbers of bark beetles over the next two years. The actual severity of future attacks can be greatly influenced by weather.

Predicting exactly which stands will attract the beetles is difficult, since they are strong fliers and can move several miles. Bark beetle attacks in 1998 were closely associated with areas that sustained ice and snow damage in 1996-97, so it would appear that susceptible stands close to existing infestation centers are more likely to be attacked than those further away and are most likely to sustain the greatest mortality. It is estimated that approximately 26,700 acres within the project area will have had some level of Douglas-fir beetle mortality within the next two years.

The Douglas-fir beetle is a major agent of change across this ecozone, with stands affected by the beetle having a high probability of experiencing a change in species composition, most often to a climax tree species, and changes in stand structure to a younger age class or a more open canopy. There are expected to be shifts in stand species composition due to mortality caused by bark beetles, but these shifts are not expected to increase the early seral species component. In most stands where over 50 percent of the basal area is killed by Douglas-fir beetles, the dominant species following the beetle infestation is likely to be grand fir. In the absence of further disturbance these stands are likely to regenerate to Douglas-fir and grand fir, so there would be no long-term shift in species composition.

In those stands in which ponderosa pine or western larch are an important component, there would be an improvement in stand condition over the short term as competition between Douglas-fir and these species is reduced. However, in the absence of further disturbance, regeneration of shrubs or shade-tolerant Douglas-fir and grand fir is likely to proliferate. This, in conjunction with high fuel accumulations that would result as the dead Douglas-fir fall to the ground, could lead to higher intensity fires that the normally fire-resistant pine and larch may not survive.

The Douglas-fir beetle is expected to cause dramatic changes in structure in some stands. However, most beetle mortality will occur in small groups scattered throughout a stand. Although these stands will have a more open appearance and lower density canopy, the basic stand age/structure will be retained. Losses of less than 25 percent of the basal area of a stand would not impact stand structure. Because beetles tend to kill trees in groups, it is likely that any holes in the canopy would be small and would quickly regenerate with shrubs or shade-tolerant species. Stands in which 26-50 percent of the basal area dies will have a more open appearance once the dead trees fall to the ground. Again, canopy openings would likely be small and would regenerate quickly. In stands where 50-100 percent of the basal area is killed by bark beetles, the results would likely be more dramatic. Groups of trees killed by the beetles would likely join together, and more of the associated small diameter Douglas-fir may be attacked. The entire stand would have a more open appearance.

In many stands, even if 50 percent of the basal area is killed, the stand would still be dominated by the residual overstory. As the number of trees killed increases, the understory vegetation becomes more dominant and the stand structure reverts to a shrub/seedling/sapling structural stage. In most stands, groups of trees killed by Douglas-fir beetles would be less than five acres in size, but in some areas bark beetle created openings would coalesce with root rot pockets and ice storm damage to create openings up to approximately 100 acres in size. These larger openings would be irregular in shape and retain groups of trees and scattered individual trees that have been unaffected by the bark beetle infestation.

Effects within the analysis areas below are those for Alternative A *in addition to* Effects Common to All Alternatives above.

Hayden Analysis Area

The Hayden analysis area has some of the highest levels of beetle infestation within the Coeur d'Alene subbasin. Approximately 18 percent of the area is considered to be a moderate to high hazard for bark beetle infestation that could kill a substantial proportion of the stand.

As stated previously, there is expected to be little change in forest cover types under the No-Action Alternative that would lead to an increase in seral species composition. This type of disturbance (bark beetle mortality) is likely to lead to regeneration of shade-tolerant species in any created openings. However, some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and resulting reduced competition.

Within the Hayden analysis area there is expected to be some reduction in the mature/large timber and the small/medium sawtimber structural stages as a result of the bark beetle attacks. It is estimated that approximately 700 acres of openings would be created and that these stands would regenerate to shade-tolerant species but may go through a prolonged shrub stage initially. Allocated and recruitment old growth does not appear to be at risk of losing old growth characteristics as a result of the Douglas-fir mortality.

Most of the approximately 11,550 acres of lands in other ownership within the analysis area have been logged several times, but there are still some areas where there are Douglas-fir susceptible to beetle attack. These stands are likely to sustain mortality but there is not enough information to determine the extent or intensity of losses that can be expected.

Coeur d'Alene Lake Analysis Area

For analysis purposes, this analysis area has been divided into eight watershed areas: Nettleton Gulch, Fernan Creek, Wolf Lodge Creek, Cedar Creek, Fourth of July Creek, Beauty Creek, Carlin Creek and "Other Coeur d'Alene Watersheds."

Nettleton Gulch Watershed

The Nettleton Gulch watershed has beetle-caused mortality on nearly 25 percent of National Forest lands, and this is expected to increase to 40 percent over the next few years. Only four percent of the area is considered to be a moderate to high hazard for bark beetle infestation, but the heavy ice storm damage that occurred in this area has led to high beetle-caused mortality.

Douglas-fir beetles could create about 100 acres of openings within the watershed, but this change in stand structure is unlikely to increase the component of early seral species. There may be a short-term benefit to existing ponderosa pine, since mortality of Douglas-fir will decrease competition for light and moisture. However, the increase in fuel loading as the dead trees fall to the ground and the fuel ladder created by regenerating Douglas-fir and grand fir will increase the risk of stand replacing fires.

There are approximately 83 acres of recruitment old growth that are at risk of being impacted by bark beetle mortality.

There are only 25 acres of private land within the Nettleton watershed. Losses due to Douglas-fir beetles are expected to be minor.

Fernan Watershed

The Fernan watershed has beetle-caused mortality in a high proportion of the area. Approximately 11 percent of the area is considered to be a moderate to high hazard for bark beetle infestation, which could kill a substantial proportion of the stand.

As stated previously, there is expected to be little change in forest cover types under the no action alternative that leads to an increase in seral species composition. This type of disturbance is likely to lead to regeneration of shade tolerant species in any created openings. However, some ponderosa pine stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition.

Within the Fernan watershed, it is estimated that bark beetles will create about 100 acres of openings in the mature/large timber and small/medium sawtimber structural stages and move these stands into the seedling/sapling stage, although they may go through an extended period when shrubs are the major component. About 13 acres of allocated old growth within the watershed are at risk of being impacted by bark beetles due to a substantial component of large Douglas-fir.

Most of the approximately 4,200 acres of lands in other ownership within the watershed have been logged several times, but there are still some areas where Douglas-fir are susceptible to beetle attack, particularly in the steeper and less accessible locations. These stands are likely to sustain mortality, but there is not enough information to determine the extent or intensity of losses that can be expected.

Wolf Lodge Watershed

A relatively small portion (six percent) of the Wolf Lodge Creek drainage has been impacted by beetle-caused mortality, even though 23 percent of the area is considered to be a moderate to high hazard for bark beetle infestation that could kill a substantial proportion of the stand. This is probably due to the relatively light ice

storm damage in this area. However, recent harvests that have occurred in the area which reduced Douglas-fir basal area over large areas may also be limiting the amount of beetle-caused mortality in this area.

As stated previously, there is expected to be little change in forest species composition due to bark beetle-caused mortality. This type of disturbance is likely to lead to regeneration of shade tolerant species in any created openings rather than the more desirable early seral species. However, some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir through reduced competition.

Within this watershed it is estimated that bark beetles will create about 75 acres of openings in the mature/large timber and small/medium sawtimber structural stages and move these stands into the seedling/sapling stage, although they may go through an extended period when shrubs are the major component.

About 51 acres of recruitment old growth and 225 acres of allocated old growth within the watershed are at risk of being impacted by bark beetles due to a substantial component of large Douglas-fir.

Most of the approximately 5,975 acres of lands in other ownership within the watershed have been logged several times, but there are still some areas where Douglas-fir are susceptible to beetle attack, particularly in the steeper and less accessible locations. These stands are likely to sustain mortality, but there is not enough information to determine the extent or intensity of losses that can be expected.

Cedar Creek Watershed

About eight percent of the Cedar Creek watershed is considered to be a moderate to high hazard for bark beetle infestation that could kill a substantial proportion of the stand.

There is expected to be little change in forest species composition under the no action alternative that leads to an increase in seral species composition. This type of disturbance is likely to lead to regeneration of shade tolerant species in any created openings.

Within this watershed, it is estimated that bark beetles will create about 75 acres of openings in the mature/large timber and small/medium sawtimber structural stages and move these stands into the seedling/sapling stage, although they may go through an extended period when shrubs are the major component. About 18 acres of recruitment old growth within the watershed are at risk of being severely impacted by bark beetles due to a substantial component of large Douglas-fir.

Most of the approximately 1,050 acres of lands in other ownership within the watershed area have been logged several times, but there are still some areas where Douglas-fir are susceptible to beetle attack. These stands are likely to sustain mortality, but there is not enough information to determine the extent or intensity of losses that can be expected.

Fourth of July Creek Watershed

About seven percent of the Fourth of July Creek area is considered to be a moderate to high hazard for beetle-caused mortality within the next two years. The current infestation affects about six percent of the area.

Douglas-fir beetles could create about 50 acres of openings within the watershed, but this change in stand structure is unlikely to increase the component of early seral species. There may be a short-term benefit to existing ponderosa pine and larch, since mortality of Douglas-fir will decrease competition for light and moisture. However, the increase in fuel loading as the dead trees fall to the ground and the fuel ladder created by regenerating Douglas-fir and grand fir will increase the risk of stand replacing fires.

There are approximately 40 acres of recruitment old growth within the watershed at risk of being severely impacted by bark beetles due to a substantial component of large Douglas-fir.

There are about 4,600 acres of lands in other ownership within the Fourth of July Creek watershed. Although most forested stands have been harvested several times, there are areas where Douglas-fir are susceptible to beetle attack. These stands are likely to sustain mortality, but there is not enough information to determine the extent or intensity of losses that can be expected.

Beauty Creek Watershed

About 26 percent of the Beauty Creek watershed is considered to be a moderate to high hazard for bark beetle infestation that could kill a substantial proportion of the stand. Approximately 12 percent of the area is currently impacted, and this is projected to increase to 25 percent over the next two years.

There is expected to be little change in forest cover types under the no action alternative that leads to an increase in seral species composition. This type of disturbance is likely to lead to regeneration of shade-tolerant species in any created openings. However, some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition.

Within this watershed, it is estimated that bark beetles will create about 150 acres of openings in the mature/large timber and small/medium sawtimber structural stages and move these stands into the seedling/sapling stage, although they may go through an extended period when shrubs are the major component. About 159 acres of the allocated old growth and about 75 acres of recruitment old growth within the watershed are at risk of being impacted by bark beetles due to a substantial component of large Douglas-fir.

There are about 275 acres of lands in other ownership within the Beauty Creek watershed, mostly adjacent to Coeur d'Alene Lake. Although most forested stands have been harvested several times, there are areas where Douglas-fir are susceptible to beetle attack. These stands are likely to sustain mortality, but there is not enough information to determine the extent or intensity of losses that can be expected.

Carlin Creek Watershed

About 34 percent of the Carlin Creek watershed is considered to be a moderate to high hazard for bark beetle infestation that could kill a substantial proportion of the stand. Approximately 20 percent of the area is currently impacted, and this is projected to increase to 30 percent over the next two years.

There is expected to be little change in forest cover types under the no action alternative that leads to an increase in seral species composition. This type of disturbance is likely to lead to regeneration of shade-tolerant species in any created openings. However, some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition.

Within this watershed, it is estimated that bark beetles will create about 75 acres of openings in the mature/large timber and small/medium sawtimber structural stages and move these stands into the seedling/sapling stage, although they may go through an extended period when shrubs are the major component.

There are about 3,450 acres of land in other ownership within the Carlin Creek watershed. Although most forested stands have been harvested several times, there are areas where Douglas-fir are susceptible to beetle attack. These stands are likely to sustain mortality, but there is not enough information to determine the extent or intensity of losses that can be expected.

Other Coeur d'Alene Watersheds

About five percent of National Forest lands within miscellaneous watersheds in the Coeur d'Alene analysis area is considered to be a moderate to high hazard for bark beetle infestation that could kill a substantial proportion of the stand. Approximately five percent of the area is currently impacted, and this is projected to increase to 10 percent over the next two years.

There is expected to be little change in forest cover types under the no action alternative that leads to an increase in seral species composition. This type of disturbance is likely to lead to regeneration of shade-tolerant species in any created openings. However, some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition.

Within these watersheds, it is estimated that bark beetles will create about 50 acres of openings in the mature/large timber and small/medium sawtimber structural stages and move these stands into the seedling/sapling stage, although they may go through an extended period when shrubs are the major component. Approximately 60 acres of allocated old growth and about 70 acres of recruitment old growth within the watershed are at risk of being impacted by bark beetles due to a substantial component of large Douglas-fir.

There are about 32,300 acres of land in other ownership within these watersheds. Although most forested stands have been harvested several times, there are areas where Douglas-fir are susceptible to beetle attack. These stands are likely to sustain mortality, but there is not enough information to determine the extent or intensity of losses that can be expected on most of these lands. The Bureau of Land Management plans to harvest 15 acres of dead and dying timber near Beauty Bay. Helicopter yarding will be utilized, and no reforestation is planned.

Chain Lakes Analysis Area

About 14 percent of National Forest lands within the Chain Lakes analysis area is considered to be a moderate to high hazard for bark beetle infestation that could kill a substantial proportion of the stand.

There is expected to be little change in forest cover types under the no action alternative that leads to an increase in seral species composition. This type of disturbance is likely to lead to regeneration of shade-tolerant species in any created openings. However, some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition.

Within this analysis area, it is estimated that bark beetles will create about 300 acres of openings in the mature/large timber structural stage and move these stands into the seedling/sapling stage, although they may go through an extended period when shrubs are the major component. Approximately 114 acres of allocated old growth and about 83 acres of recruitment old growth within the watershed are at risk of being impacted by bark beetles due to a substantial component of large Douglas-fir. These stands should be evaluated following the beetle outbreak to determine if the impact of the beetles has been detrimental to old growth characteristics. Increases in the dead tree component in these old growth stands may also enhance old growth characteristics.

There are about 38,825 acres of land in other ownership within the analysis area. Although most forested stands have been harvested several times, there are areas where Douglas-fir are susceptible to beetle attack. These stands are likely to sustain mortality, but there is not enough information to determine the extent or intensity of losses that can be expected on most of these lands. The Bureau of Land Management plans to harvest 63 acres of dead and dying timber near Killarney Lake. Helicopter yarding will be utilized; planting of approximately 40 acres with white pine, western larch and ponderosa pine is planned.

Steamboat Analysis Area

About 14 percent of National Forest lands within the Steamboat analysis area is considered to be a moderate to high hazard for bark beetle infestation that could kill a substantial proportion of the stand. This area has very light beetle infestation at present, and only four percent of the area is projected to sustain bark beetle mortality. Approximately 50 acres of allocated old growth are at risk of beetle mortality, but due to low infestation levels the old growth character should not be impacted. There is expected to be minimal impact to stand structure or species composition from Douglas-fir beetle activity.

Bumblebee Analysis Area

About 10 percent of the area within the Bumblebee analysis area is considered to be a moderate to high hazard for bark beetle infestation that could kill a substantial proportion of the stand. This area has very light beetle infestation at present, so only five percent of the area is projected to sustain bark beetle mortality.

There is expected to be little change in forest cover types under the no action alternative that leads to an increase in seral species composition. This type of disturbance is likely to lead to regeneration of shade-tolerant species in any created openings.

Within this analysis area, it is estimated that bark beetles will create about 125 acres of openings in the mature/large timber structural stage and move these stands into the seedling/sapling stage, although they may go through an extended period when shrubs are the major component. None of the allocated or recruitment old growth appears to be at risk from Douglas-fir beetles.

There are about 1,000 acres of land in other ownership within the analysis area. Although most forested stands have been harvested several times, there are areas where Douglas-fir are susceptible to beetle attack. These stands are likely to sustain mortality, but there is not enough information to determine the extent or intensity of losses that can be expected.

Hart Analysis Area

The Hart analysis area has been split into two watershed areas for analysis purposes: the Hart and Beaver Creek areas.

Hart Creek Area

About 14 percent of National Forest lands within the Hart Creek area is considered to be a moderate to high hazard for bark beetle infestation that could kill a substantial portion of the stand. This area has light beetle infestation at present, so only six percent of the area is projected to be impacted by beetles.

There is expected to be little change in forest cover types under the no action alternative that leads to an increase in seral species composition. This type of disturbance is likely to lead to regeneration of shade-tolerant species in any created openings.

Within this area, it is estimated that bark beetles will create about 125 acres of openings in the old forest, mature/large timber and small/medium sawtimber structural stages and move these stands into the seedling/sapling stage, although they may go through an extended period when shrubs are the major component. About 131 acres of the allocated old growth appears to be at risk of being impacted by Douglas-fir beetles due to a substantial component of large Douglas-fir.

There are about 1,525 acres of land in other ownership within the area. Although some forested stands have been cleared for pasture or homesites, there are areas where Douglas-fir are susceptible to beetle attack.

These stands are likely to sustain mortality, but there is not enough information to determine the extent or intensity of losses that can be expected.

Beaver Creek area

About 43 percent of National Forest lands within the Beaver Creek area is considered to be a moderate to high hazard for bark beetle infestation that could kill a substantial proportion of the stand.

There is expected to be little change in forest cover types under the no action alternative that leads to an increase in seral species composition. This type of disturbance is likely to lead to regeneration of shade-tolerant species in any created openings.

Within this area, it is estimated that bark beetles will create about 150 acres of openings in the mature/large timber structural stages and move these stands into the seedling/sapling stage, although they may go through an extended period when shrubs are the major component. About 120 acres of the allocated old growth appears to be at risk from Douglas-fir beetles due to a substantial component of large Douglas-fir.

There are about 300 acres of land in other ownership within the area. Although some forested stands have been cleared for pasture or homesites, there are areas where Douglas-fir are susceptible to beetle attack. These stands are likely to sustain mortality, but there is not enough information to determine the extent or intensity of losses that can be expected.

Alternative B

From a vegetation standpoint, the objective of this alternative is to harvest dead and dying trees in areas attacked by bark beetles and to restore long-lived seral tree species such as white pine, western larch and ponderosa pine in stands where bark beetles, root disease, and storm damage have killed a substantial portion (greater than 50 percent) of the basal area of the stand. Riparian Habitat Conservation Areas (RHCA), known locations of sensitive plants and special wildlife habitat areas were excluded.

Most stands would be treated by selective removal of trees killed by bark beetles (this includes trees that are attacked by beetles but may still have green crowns) and associated trees killed by root disease, other pathogens or ice and snow damage. Incidental green trees may need to be removed from skyline corridors or skid trails, or for safety reasons.

Regeneration harvests would be used in stands where most trees have been killed and retention of the residual live trees is not necessary to meet visual quality and wildlife objectives. Some green trees not affected by bark beetles may be removed from these stands in order to create a suitable environment for the establishment of seral species. Logging slash and competing vegetation would be treated by burning in these stands prior to planting with the desired species. Regeneration harvests would range from five to approximately 53 acres in size, depending on the extent of Douglas-fir beetle mortality and existing root disease and ice storm damage. These openings would retain groups of trees and scattered individual trees that have been unaffected by the bark beetle infestation. Generally, these regeneration harvests would retain less than 30 percent of the stand basal area.

Approximately 852 acres would achieve the desired species composition through timber harvest and associated planting. These stands would also be more likely to provide the desired long-term forest structure since the planted species would be more resistant to root disease. An estimated 9,379 acres would be treated through selective removal of dead and dying trees, but this would not improve species composition or long-term stand structure.

Effects within the analysis areas below are those for Alternative B *in addition to* Effects Common to All Alternatives, Effects Common to All Action Alternatives and effects of Alternative A above.

Hayden Analysis Area

Treatments in the Hayden analysis area include 2,101 acres of selective removal of dead and dying trees and 388 acres of regeneration harvests. Much of the area around Hayden Lake is in Management Area (MA) 9. On the IPNF this management area designation was generally used to denote lands that were not suitable for timber production. Although salvage and removal of miscellaneous products is allowed, scheduled timber harvest is not. The MA-9 around Hayden Lake is physically suitable for timber production and forest regeneration, but was designated MA-9 in order to protect the visual resources near the lake. In this alternative, regeneration harvests in MA-9 are on sites suitable for timber production where bark beetles have killed enough of the stand to create an opportunity to plant early seral species and that are not in visually sensitive areas.

Douglas-fir beetles are likely to kill more than 50 percent of the stand basal area on additional areas within MA-9. Logging slash and understory vegetation would normally be treated in these areas to prepare a site for planting, but these stands are in visually sensitive areas and these more intensive treatments may be unacceptable to maintaining visual quality. Much of the Hayden area can be seen from homes along Hayden Lake.

Planting of long-lived seral tree species would provide the desired species composition on 388 acres, but this is less than two percent of National Forest land within the analysis area. These regenerated stands would also be more likely to provide the desired long-term forest structure, since the planted species would be more resistant to root disease. Selective removal of dead and dying trees on 2,101 acres would not improve species composition or long-term forest structure.

Coeur d'Alene Analysis Area

Nettleton Gulch

Treatments in the Nettleton Gulch watershed include 194 acres of selective removal of dead and dying trees. There was some potential for regeneration harvests, but much of the area is visually sensitive.

There would be no improvement in species composition or long term forest structure, since there would be no planting of desired species.

Fernan Watershed

Proposed treatments in the Fernan watershed include 1,613 acres of selective removal of dead and dying trees and 22 acres of regeneration harvests. There was potential for increased regeneration harvests in this area, but most of the watershed is visually sensitive due to the major travel route from the city of Coeur d'Alene. Some potential regeneration units were also in important flammulated owl habitat.

Planting of long-lived seral tree species would provide the desired species composition on 22 acres, but this is less than one percent of the watershed. These regenerated stands would also be more likely to provide the desired long-term forest structure, since the planted species would be more resistant to root disease. Some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition. Selective removal of dead and dying trees on 1,613 acres would not improve species composition or long-term forest structure.

Wolf Lodge Watershed

Treatments in the Wolf Lodge Creek watershed include 908 acres of selective removal of dead and dying trees.

There would be no increase in long-lived seral species as a result of this alternative. However, some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition. Selective removal of dead and dying trees on 908 acres would not improve species composition or long-term forest structure.

Cedar Creek Watershed

Treatments in the Cedar Creek watershed include 469 acres of selective removal of dead and dying trees and 15 acres of regeneration harvests.

Planting of long-lived seral tree species would provide the desired species composition on only 15 acres, which is less than one percent of National Forest land within the watershed. These regenerated areas would also be more likely to provide the desired long-term forest structure, since the planted species would be more resistant to root disease. Selective removal of dead and dying trees on 469 acres would not improve species composition or long-term forest structure.

Fourth of July Creek Watershed

Treatments in the Fourth of July Creek watershed include 428 acres of selective removal of dead and dying trees and 20 acres of regeneration harvests. There was some potential for other regeneration harvests, but portions of the watershed are visually sensitive.

Planting of long-lived seral tree species would provide the desired species composition on only 20 acres, which is less than one percent of National Forest land within the watershed. These regenerated areas would also be more likely to provide the desired long-term forest structure, since the planted species would be more resistant to root disease. Selective removal of dead and dying trees on 428 acres would not improve species composition or long-term forest structure.

Beauty Creek Watershed

Treatments in the Beauty Creek watershed include 746 acres of selective removal of dead and dying trees.

There would be no increase in early seral species composition. However, some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition.

Carlin Creek Watershed

Treatments in the Carlin Creek Watershed include 390 acres of selective removal of dead and dying trees and 52 acres of regeneration harvests.

Long-lived seral species composition would be improved on 52 acres, but this is less than two percent of the watershed. These stands would also be more likely to provide the desired long-term forest structure, since the planted species would be resistant to root disease. Selective removal of dead and dying trees on 390 acres would not improve species composition or long-term forest structure. However, some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition.

Other Coeur d'Alene Watersheds

Proposed treatments in the other Coeur d'Alene watersheds include only 12 acres of selective removal of dead and dying trees. These areas are part of larger stands in adjacent watersheds.

There would be no improvement in species composition or long term forest structure since, there would be no planting of desired species.

Chain Lakes Analysis Area

Proposed treatments in the Chain Lakes analysis area include 1,722 acres of selective removal of dead and dying trees and 155 acres of regeneration harvests.

Long-lived seral species composition would be improved on 155 acres, but this is less than one percent of the National Forest land within the analysis area. These stands would also be more likely to provide the desired long-term forest structure, since the planted species would be resistant to root disease. Selective removal of dead and dying trees on 1,722 acres would not improve species composition or long-term forest structure. However, some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition.

Steamboat Analysis Area

Proposed treatments in the Steamboat analysis area include 98 acres of selective removal of dead and dying trees. There would be no opportunity to plant long-lived seral species.

There would be no increase in early seral species composition and no improvement in long-term forest structure.

Bumblebee Analysis Area

Treatments in the Bumblebee analysis area would include 87 acres of selective removal of dead and dying trees and 19 acres of regeneration harvests.

Long-lived seral species composition would be improved on 19 acres, but this is less than 0.1 percent of the analysis area. These stands would also be more likely to provide the desired long-term forest structure, since the planted species would be resistant to root disease. Selective removal of dead and dying trees on 87 acres would not improve species composition or long-term forest structure.

Hart Analysis Area

Hart Creek Area

Treatments in the Hart Creek area would include 243 acres of selective removal of dead and dying trees and 37 acres of regeneration harvests.

Long-lived seral species composition would be improved on 37 acres, but this is less than one percent of the watershed. These stands would also be more likely to provide the desired long-term forest structure, since the planted species would be resistant to root disease. Selective removal of dead and dying trees on 243 acres would not improve species composition or long-term forest structure.

Beaver Creek Area

Treatments in the Beaver Creek area would include 368 acres of selective removal of dead and dying trees and 144 acres of regeneration harvests.

Long-lived seral species composition would be improved on 144 acres, which is about six percent of the area (This does not include the entire Beaver Creek watershed). These stands would also be more likely to provide the desired long-term forest structure since the planted species would be resistant to root disease. Selective removal of dead and dying trees on 368 acres would not improve species composition or long-term forest structure.

Alternative C

From a vegetation standpoint, the objectives of Alternative C would be the same as those for Alternative B and treatments would be exactly the same. The difference is that there would be no new road construction, which means there would be an increased reliance on helicopter yarding.

Approximately 852 acres would achieve the desired species composition through timber harvest and associated planting. These stands would also be more likely to provide the desired long-term forest structure, since the planted species would be more resistant to root disease. About 9,379 acres would be treated through selective removal of dead and dying trees but this would not improve species composition or long-term stand structure.

Direct, indirect and cumulative effects of this alternative would be the same as with Alternative B, and are *in addition to* Effects Common to All Alternatives, Effects Common to All Action Alternatives and effects of Alternative A above.

Alternative D

From a vegetation standpoint, the objective of this alternative is to harvest dead and dying trees in areas attacked by bark beetles and to restore long-lived seral tree species such as white pine, western larch and ponderosa pine in stands where bark beetles, root disease and storm damage have killed a substantial portion (greater than 50 percent) of the basal area of the stand. Additionally, improvement harvests would occur in stands with a high component of ponderosa pine and western larch that also contain Douglas-fir which is being attacked by bark beetles. The objective of this thinning is to improve tree vigor of the residual trees, particularly larch and pine, and to restore these stands to more closely match historic conditions. Prescribed fire would be used on approximately 1,628 acres outside of harvest units to improve forage for big game animals.

Larch will commonly grow two to three times faster in height than its more shade-tolerant associates. This advantage lasts 30 to 40 years, at which time the gap in growth rate begins to narrow (Schmidt and Shearer 1995). Because larch is shade-intolerant, increased competition with Douglas-fir, grand fir and hemlock will cause lower portions of larch crowns to die. Larch can maintain itself in mixed stands only as long as it holds a dominant position in the crown canopy (Schmid, Shearer and Roe 1976). As tree vigor declines, mortality can be expected to increase.

Grand fir and Douglas-fir that are not at serious risk of beetle attack would be harvested in conjunction with dead tree removal to reduce stocking levels. In ponderosa pine stands, most green trees harvested would be Douglas-fir less than 14" in diameter. Harvest would be followed by underburning to kill some of the sub-merchantable shade-tolerant species and to re-introduce fire to these ecosystems. Some natural regeneration of ponderosa pine, larch and white pine, as well as shade-tolerant species, is anticipated following burning but this is not a major objective. Thinning in larch stands would entail removal of some codominant trees in order to provide adequate space for larch crown development.

Most stands would be treated by selective removal of trees killed by bark beetles (this includes trees that are attacked by beetles but may still have green crowns) and associated trees killed by root disease or other pathogens.

Regeneration harvests would be used in stands where most trees have been killed and retention of all the residual live trees is not necessary to meet wildlife objectives. Green trees not affected by bark beetles may be removed from regenerated stands in order to create a suitable environment for the establishment of seral species. Logging slash and competing vegetation would be treated by burning in these stands prior to planting with the desired species. Regeneration harvests would range from five to approximately 64 acres in size, depending on the extent of Douglas-fir beetle mortality and existing root disease and ice storm damage. These openings would retain groups of trees and scattered individual trees that have been unaffected by the bark beetle infestation. Generally, these regeneration harvests would retain less than 30 percent of the stand basal area.

Stands with adequate ponderosa pine and western larch would be thinned to improve residual tree vigor by removal of smaller diameter grand fir and Douglas-fir. In ponderosa pine stands this, in conjunction with understory burning, would likely move stands toward a more open single-storied or two-storied structure instead of the current multi-storied stands. These stands would be more likely to have moderate or low intensity fires rather than the high intensity stand replacing fires to which they are now susceptible.

Approximately 1,176 acres would achieve the desired species composition through regeneration harvests and associated planting. These stands would also be more likely to provide the desired long-term forest structure, since the planted species would be more resistant to root disease. Long-term stand structure and composition would be improved on about 1,161 acres through improvement harvests and thinning in ponderosa pine and western larch stands. Additionally, 9,886 acres would be treated through selective removal of dead and dying trees, but this would not improve species composition or long-term stand structure.

Effects within the analysis areas below are those for Alternative D *in addition to* Effects Common to All Alternatives, Effects Common to All Action Alternatives and effects of Alternative A above.

Hayden Analysis Area

Treatments in the Hayden analysis area would include 2,527 acres of selective removal of dead and dying trees, 558 acres of regeneration harvests, 200 acres of improvement harvests in ponderosa pine stands and 135 acres of thinning in larch stands. Much of the area around Hayden Lake is in Management Area (MA) 9. On the IPNF this management area designation was generally used to denote lands that were not suitable for timber production. Although salvage and removal of miscellaneous products is allowed, scheduled timber harvest is not. The MA-9 around Hayden Lake is physically suitable for timber production and forest regeneration, but was designated MA-9 in order to protect the visual resources near the lake. In this alternative, regeneration harvests in MA-9 are on sites suitable for timber production where bark beetles have killed enough of the stand to create an opportunity to plant early seral species and may include some units that would be visible from sites around Hayden Lake. Logging slash and understory vegetation would be treated in these areas to prepare a site for planting, but as much overstory as is practical would be retained to moderate impacts to visual quality. Regeneration harvests in the more visually sensitive areas would provide for improved stand structure and species composition over the long-term but may impact visual quality in the short term.

Regeneration harvests within the Hayden analysis area and subsequent planting would improve species composition on 558 acres, and stand structure and composition would be improved on about 335 acres through improvement harvests and thinning in ponderosa pine and western larch stands. This is about three

percent of this analysis area. Additionally, 2,527 acres would be treated through selective removal of dead and dying trees, but this would not improve species composition or long-term stand structure.

Coeur d'Alene Lake Analysis Area

Nettleton Gulch

Treatments in the Nettleton Gulch watershed would include 225 acres of selective removal of dead and dying trees and 14 acres of regeneration harvests.

Regeneration harvests within the Nettleton Gulch Area and subsequent planting would improve species composition on 14 acres. This is about one percent of this watershed. Additionally, 225 acres would be treated through selective removal of dead and dying trees, but this would not improve species composition or long-term stand structure.

Fernan Watershed

Proposed treatments in the Fernan watershed include 1,654 acres of selective removal of dead and dying trees, 48 acres of regeneration harvests and 116 acres of improvement harvests in ponderosa pine. Some potential regeneration harvests are also proposed in important flammulated owl habitat.

Regeneration harvests within the watershed and subsequent planting would improve species composition on 48 acres; stand structure and composition would be improved on about 116 acres through improvement harvests and thinning in ponderosa pine stands. This is about two percent of this watershed. Additionally, 1,654 acres would be treated through selective removal of dead and dying trees, but this would not improve species composition or long-term stand structure.

Wolf Lodge Watershed

Proposed treatments in the Wolf Lodge Creek watershed include 894 acres of selective removal of dead and dying trees, 229 acres of improvement harvest in ponderosa pine stands and 41 acres of thinning in larch stands.

Stand structure and composition would be improved on about 270 acres through improvement harvests and thinning in ponderosa pine and western larch stands. About one percent of the watershed would be trended toward the desired stand structure.

Cedar Creek Watershed

Treatments in the Cedar Creek Watershed would be the same as for Alternative B.

Planting of long-lived seral tree species would provide the desired species composition on only 15 acres, which is less than one percent of National Forest land within the watershed. These regenerated areas would also be more likely to provide the desired long-term forest structure, since the planted species would be more resistant to root disease. Selective removal of dead and dying trees on 469 acres would not improve species composition or long-term forest structure.

Fourth of July Creek Watershed

Treatments in the Fourth of July Creek watershed would include 400 acres of selective removal of dead and dying trees and 49 acres of regeneration harvests.

Planting of long-lived seral tree species would provide the desired species composition on 49 acres, which is less than one percent of National Forest land within the watershed. These regenerated areas would also be more likely to provide the desired long-term forest structure, since the planted species would be more resistant to root disease. Selective removal of dead and dying trees on 400 acres would not improve species composition or long-term forest structure.

Beauty Creek Watershed

Proposed treatments in the Beauty Creek watershed include 656 acres of selective removal of dead and dying trees and 251 acres of thinning in larch stands.

Stand structure and composition would be improved on 251 acres through thinning in western larch stands. This is about four percent of the watershed.

Carlin Creek Watershed

Treatments in the Carlin Creek Watershed would include 440 acres of selective removal of dead and dying trees and 52 acres of regeneration harvests. Additionally, there would be 37 acres of improvement harvests in ponderosa pine stands and 45 acres of thinning in larch stands.

Regeneration harvests and subsequent planting would improve species composition on 52 acres; stand structure and composition would be improved on about 82 acres through improvement harvests and thinning in ponderosa pine and western larch stands. This is about three percent of this watershed. Additionally, 440 acres would be treated through selective removal of dead and dying trees, but this would not improve species composition or long-term stand structure.

Other Coeur d'Alene Watersheds

Treatments in the other Coeur d'Alene watersheds would include 12 acres of selective removal of dead and dying trees and 29 acres of thinning in larch stands.

Stand structure and composition would be improved on about 29 acres through thinning in western larch stands. This is less than one percent of these watersheds. Only 12 acres would be treated through selective removal of dead and dying trees, but this would not improve species composition or long-term stand structure.

Chain Lakes Analysis Area

Proposed treatments in the Chain Lakes analysis area include 1,895 acres of selective removal of dead and dying trees, 157 acres of regeneration harvests and 78 acres of ponderosa pine improvement harvests.

Regeneration harvests and subsequent planting would improve species composition on 157 acres; stand structure and composition would be improved on about 78 acres through improvement harvests in ponderosa pine stands. This is about two percent of this analysis area. Additionally, 1,895 acres would be treated through selective removal of dead and dying trees, but this would not improve species composition or long-term stand structure.

Steamboat Analysis Area

Treatments in the Steamboat analysis area include 98 acres of selective removal of dead and dying trees. This is the same as Alternatives B and C.

There would be no improvement in species composition or long-term stand structure.

Bumblebee Analysis Area

Proposed treatments in the Bumblebee analysis area include 23 acres of selective removal of dead and dying trees and 83 acres of regeneration harvests.

Regeneration harvests and subsequent planting would improve species composition on 83 acres. This is less than one percent of this analysis area. Additionally, 23 acres would be treated through selective removal of dead and dying trees, but this would not improve species composition or long-term stand structure.

Hart Analysis Area

Hart Creek Area

Proposed treatments in the Hart Creek area include 243 acres of selective removal of dead and dying trees and 37 acres of regeneration harvests. This is the same as Alternatives B and C.

Regeneration harvests and subsequent planting would improve species composition on 37 acres. This is less than one percent of this watershed. Additionally, 243 acres would be treated through selective removal of dead and dying trees, but this would not improve species composition or long-term stand structure.

Beaver Creek Area

Proposed treatments in the Beaver Creek area include 350 acres of selective removal of dead and dying trees and 163 acres of regeneration harvests.

Regeneration harvests and subsequent planting would improve species composition on 163 acres, which is about six percent of this area (this does not include the entire Beaver Creek watershed). Additionally, 350 acres would be treated through selective removal of dead and dying trees, but this would not improve species composition or long-term stand structure.

Alternative E

The objective of this alternative is to harvest only dead and dying trees in areas currently impacted by Douglas-fir beetles. No additional green trees would be harvested to create suitable conditions for planting. Underburning and planting of seral species could be done where bark beetle mortality created adequate canopy openings for successful establishment of shade intolerant species. Harvest openings would range from five to approximately 53 acres in size, depending on the extent of Douglas-fir beetle mortality and existing root disease and ice storm damage. These openings would retain groups of trees and scattered individual trees that have been unaffected by the bark beetle infestation. Openings to be planted would range from five to 53 acres in size.

Openings created by bark beetles in areas to be harvested by helicopter would be allowed to regenerate naturally. There would be no site preparation in these stands, so shade-tolerant species would likely dominate this natural regeneration.

In this alternative, there would be 10,231 acres of selective removal of dead and dying trees only. Of this amount, 573 acres would be naturally regenerated, and 373 acres would be underburned and planted. Planting would improve species composition and long-term forest structure on 373 acres.

Hayden Analysis Area

Treatments in the Hayden analysis area would include 2,489 acres of selective removal of dead and dying trees only. Of this amount, 175 acres would be planted with early seral tree species. Other areas where bark beetles will cause extensive mortality would not be planted, because residual live trees would likely be killed during site preparation activities.

Much of the area around Hayden Lake is in Management Area (MA) 9. On the IPNF this management area designation was generally used to denote lands that were not suitable for timber production. Although salvage and removal of miscellaneous products is allowed, scheduled timber harvest is not. The MA-9 around Hayden Lake is physically suitable for timber production and forest regeneration, but was so designated in order to protect the visual resources near the lake. In this alternative, proposed regeneration harvests in MA-9 are on sites suitable for timber production where bark beetles have killed enough of the stand to create an opportunity to plant early seral species and that are not in visually sensitive areas.

Douglas-fir beetles are likely to kill more than 50 percent of the stand basal area on additional areas within MA-9. Logging slash and understory vegetation would normally be treated in these areas to prepare a site for planting; however, those stands are in visually sensitive areas, and more intensive treatments may be unacceptable to maintaining visual quality. Much of the Hayden area can be seen from homes along Hayden Lake.

Planting of long-lived seral tree species would provide the desired species composition on 175 acres, but this is less than one percent of National Forest land within the analysis area. These regenerated stands would also be more likely to provide the desired long-term forest structure, since the planted species would be more resistant to root disease. Dead tree removal, without subsequent site preparation and planting, on 2,314 acres would not improve species composition or long-term forest structure.

Coeur d'Alene Analysis Area

Nettleton Gulch

Proposed treatments in the Nettleton Gulch watershed include 194 acres of selective removal of dead and dying trees. There was some potential for regeneration harvests, but much of the area is visually sensitive.

There would be no improvement in species composition or long term forest structure since there would be no planting of desired species.

Fernan Watershed

Treatments in the Fernan watershed would include 1,635 acres of selective removal of dead and dying trees. There was potential for regeneration harvests in this area, but most of the watershed is visually sensitive due to the major travel route from the city of Coeur d'Alene. Some potential regeneration units were also in important flammulated owl habitat.

There would be no increase in long-lived seral species as a result of this alternative. Some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition. Selective removal of dead trees on 1,635 acres would not improve species composition or long-term forest structure.

Wolf Lodge Watershed

Treatments in the Wolf Lodge Creek watershed would include 908 acres of selective removal of dead and dying trees.

There would be no increase in long-lived seral species as a result of this alternative. However, some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition. Selective removal of dead trees on 908 acres would not improve species composition or long-term forest structure.

Cedar Creek Watershed

Proposed treatments in the Cedar Creek watershed include 484 acres of selective removal of dead and dying trees only.

There would be no increase in long-lived seral species as a result of this alternative. Some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition. Selective removal of dead trees on 484 acres would not improve species composition or long-term forest structure.

Fourth of July Creek Watershed

Proposed treatments in the Fourth of July Creek watershed include 448 acres of selective removal of dead and dying trees only. Of this amount, 20 acres would be planted with early seral tree species.

Planting of long-lived seral tree species would provide the desired species composition on only 20 acres, which is less than one percent of National Forest land within the watershed. These regenerated areas would also be more likely to provide the desired long-term forest structure, since the planted species would be more resistant to root disease. Selective removal of dead trees on 428 acres would not improve species composition or long-term forest structure.

Beauty Creek Watershed

Proposed treatments in the Beauty Creek watershed include 746 acres of selective removal of dead and dying trees.

There would be no increase in early seral species composition. However, some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition.

Carlin Creek Watershed

Proposed treatments in the Carlin Creek Watershed include 442 acres of selective removal of dead and dying trees only. Some areas where bark beetles will cause extensive mortality would not be planted, because residual live trees would likely be killed during site preparation activities.

Selective removal of dead trees on 442 acres would not improve species composition or long-term forest structure. However, some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition.

Other Coeur d'Alene Watersheds

Proposed treatments in the other Coeur d'Alene watersheds include only 12 acres of selective removal of dead and dying trees. These areas are part of larger stands in adjacent watersheds.

There would be no improvement in species composition or long term forest structure, since there would be no planting of desired species.

Chain Lakes Analysis Area

Treatments in the Chain Lakes analysis area would include 1,877 acres of selective removal of dead and dying trees only. Of this amount, 54 acres would be planted with early seral tree species. Other areas where bark beetles will cause extensive mortality would not be planted, because residual live trees would likely be killed during site preparation activities.

Long-lived seral species composition would be improved on 54 acres, but this is less than one percent of National Forest lands within the watershed. These stands would also be more likely to provide the desired long-term forest structure, since the planted species would be resistant to root disease. Selective removal of dead trees on 1,823 acres would not improve species composition or long-term forest structure. However, some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition.

Steamboat Analysis Area

Proposed treatments in the Steamboat analysis area include 98 acres of selective removal of dead and dying trees. There would be no opportunity to plant long-lived seral species.

There would be no increase in early seral species composition and no improvement in long-term forest structure.

Bumblebee Analysis Area

Proposed treatments in the Bumblebee analysis area include 106 acres of selective removal of dead and dying trees only. Of this amount, 19 acres would be planted with early seral tree species.

Long-lived seral species composition would be improved on 19 acres, but this is less than 0.1 percent of the watershed. These stands would also be more likely to provide the desired long-term forest structure, since the planted species would be resistant to root disease. Selective removal of dead trees on 87 acres would not improve species composition or long-term forest structure.

Hart Analysis Area

Hart Creek Area

Proposed treatments in the Hart Creek area include 280 acres of selective removal of dead and dying trees only. Of this amount, 37 acres would be planted with early seral tree species.

Long-lived seral species composition would be improved on 37 acres, but this is less than one percent of the watershed. These stands would also be more likely to provide the desired long-term forest structure, since the planted species would be resistant to root disease. Selective removal of dead trees only on 243 acres would not improve species composition or long-term forest structure.

Beaver Creek Area

Proposed treatments in the Beaver Creek area include 512 acres of selective removal of dead and dying trees only. Of this amount, 68 acres would be planted with early seral tree species. Other areas where bark beetles will cause extensive mortality would not be planted, because residual live trees would likely be killed during site preparation activities.

Long-lived seral species composition would be improved on 68 acres, which is about two percent of the area (this does not include the entire Beaver Creek watershed). These stands would also be more likely to provide the desired long-term forest structure, since the planted species would resistant to root disease. Selective removal of dead trees on 445 acres would not improve species composition or long-term forest structure.

Alternative F

The objective of this alternative is to aggressively treat high fuel levels that would be created by heavy Douglas-fir beetle mortality in areas in close proximity to private lands and, in particular, in the urban-interface areas. This is to reduce the risk of high intensity fires causing damage to private lands and to create some buffers to help reduce the risk of spread of fire from private lands to National Forest lands.

Where underburning would be used to treat fuels in selective harvest units, there is some concern that scorching of large Douglas-fir within these stands could make them attractive to additional bark beetle attacks. Delaying underburning until the current outbreak has subside would minimize this risk.

Regeneration harvests would be used in stands where most trees have been killed by bark beetles, root disease, and ice storm damage, and where retention of the residual live trees is not necessary to meet visual quality and wildlife objectives. Some green trees not affected by bark beetles could be removed from these stands in order to create a suitable environment for the establishment of seral species. Logging slash and competing vegetation would be treated by burning in these stands prior to planting with the desired species. Regeneration harvests would range from five to approximately 53 acres in size, depending on the extent of Douglas-fir beetle mortality and existing root disease and ice storm damage. These openings would retain groups of trees and scattered individual trees that have been unaffected by the bark beetle infestation. Generally, these regeneration harvests would retain less than 30 percent of the stand basal area.

In this alternative, there would be 7,275 acres of selective removal of dead trees only and 761 acres of regeneration harvests followed by planting. Prescribed fire would be used on approximately 1,628 acres to improve forage for big game animals.

Effects within the analysis areas below are those for Alternative F *in addition to* Effects Common to All Alternatives, Effects Common to All Action Alternatives and effects of Alternative A above.

Hayden Analysis Area

Vegetation treatments would be the same as in Alternative B except that there would be additional fuel treatments in some selective harvest units. In selective harvest units where underburning would be used to treat fuels, some additional mortality would be expected. This would be relatively minor.

Planting of long-lived seral tree species would provide the desired species composition on 388 acres, but this is less than two percent of the analysis area. These stands would also be more likely to provide the desired long-term forest structure, since the planted species would be more resistant to root disease. Selective removal of dead trees on 2,101 acres would not improve species composition or long-term forest structure.

Coeur d'Alene Lake Analysis Area

Nettleton Gulch

Proposed treatments in the Nettleton Gulch watershed include 177 acres of selective removal of dead and dying trees. There was some potential for regeneration harvests, but much of the area is visually sensitive.

There would be no improvement in species composition or long term forest structure, since there would be no planting of desired species.

Fernan Watershed

Vegetation treatments would be the same as in alternative B except that there would be additional fuel treatments in some selective harvest units. In selective harvest units where underburning would be used to treat fuels, some additional mortality would be expected. This would be relatively minor.

Planting of long-lived seral tree species would provide the desired species composition on 22 acres, but this is less than one percent of the watershed. These stands would also be more likely to provide the desired long-term forest structure, since the planted species would be more resistant to root disease. Some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition. Selective removal of dead trees on 1,613 acres would not improve species composition or long-term forest structure.

Wolf Lodge Watershed

Proposed vegetation treatments would be the same as in Alternative B except that there would be additional fuel treatments in some selective harvest units. In selective harvest units where underburning would be used to treat fuels, some additional mortality would be expected. This would be relatively minor.

There would be no increase in long-lived seral species as a result of this alternative. However, some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and reduced competition. Selective removal of dead trees on 908 acres would not improve species composition or long-term forest structure.

Cedar Creek Watershed

Proposed treatments in the Cedar Creek Watershed include 324 acres of selective removal of dead and dying trees. In selective harvest units where underburning would be used to treat fuels, some additional mortality would be expected. This would be relatively minor.

There would be no improvement in species composition or long term forest structure, since there would be no planting of desired species.

Fourth of July Creek Watershed

Proposed vegetation treatments within the Fourth of July Creek watershed have been dropped since there is little private land at risk in this area.

Beauty Creek Watershed

Proposed vegetation treatments within the Beauty Creek watershed have been dropped since there is little private land at risk in this area.

Carlin Creek Watershed

Proposed treatments in the Carlin Creek watershed include 243 acres of selective removal of dead and dying trees and 52 acres of regeneration harvests. In selective harvest units where underburning would be used to treat fuels, some additional mortality would be expected. This would be relatively minor.

The regeneration harvests would improve species composition on 52 acres, but this is less than two percent of the watershed.

Other Coeur d'Alene Watersheds

There would be no treatments in the other Coeur d'Alene Lake watersheds. There would be no improvement in species composition or long-term forest structure.

Chain Lakes Analysis Area

Proposed treatments in the Chain Lakes analysis area include 1,381 acres of selective removal of dead and dying trees and 155 acres of regeneration harvests. In selective harvest units where underburning would be used to treat fuels, some additional mortality would be expected. This would be relatively minor.

The regeneration harvests would provide an opportunity to plant long-lived seral species on 155 acres, but this is only one percent of the analysis area.

Steamboat Analysis Area

Proposed vegetation treatments within the Steamboat analysis area have been dropped under Alternative F, since there is little private land at risk in this area.

Bumblebee Analysis Area

Proposed vegetation treatments within the Bumblebee analysis area have been dropped under Alternative F, since there is little private land at risk in this area.

Hart Analysis Area

Hart Watershed

Proposed vegetation treatments in the Hart area include 160 acres of selective removal of dead and dying trees. In selective harvest units where underburning would used to treat fuels, some additional mortality would be expected. This would be relatively minor.

There would be no improvement in species composition or long term forest structure, since there would be no planting of desired species.

Beaver Creek Area

Proposed vegetation treatments would be the same as in alternative B except that there would be additional fuel treatments in some selective harvest units. In selective harvest units where underburning would be used to treat fuels, some additional mortality would be expected. This would be relatively minor.

Long-lived seral species composition would be improved on 144 acres, which is about six percent of the area (this does not include the entire Beaver Creek watershed). These stands would also be more likely to provide

the desired long-term forest structure since the planted species would be resistant to root disease. Selective removal of dead trees on 368 acres would not improve species composition or long-term forest structure.

Alternative G

This alternative proposes to restore watersheds, wildlife habitat and vegetation without any timber harvesting. Other funding sources would be utilized to reduce the impact of roads on watershed quality and wildlife habitat. The alternative also proposes to use prescribed fire to enhance wildlife habitat in areas where forage can be improved or to restore vegetation composition and structure in areas where ponderosa pine is a major component of the stand. In the latter case, underburning would be used to reduce existing down woody debris and the component of shade tolerant species such as Douglas-fir and grand fir which have become established due to fire exclusion. Stands to be treated were selected based on stand exam information which indicated a substantial component of ponderosa pine or they were selected to enhance wildlife habitat. Approximately 1,115 acres would be treated.

Effects within the analysis areas below are those for Alternative G *in addition to* Effects Common to All Alternatives, Effects Common to All Action Alternatives and effects of Alternative A above.

Hayden Analysis Area

Prescribed burning would be utilized on approximately 776 acres within the Hayden analysis area. Of this amount, approximately 172 acres would occur in stands that contain ponderosa pine that would benefit from reduce competition with Douglas-fir and/or grand fir. In order to reduce fuel ladders that could potentially carry fire into the crowns of desirable trees, sub-merchantable (less than 7 inches in diameter) grand fir and Douglas-fir would be felled prior to burning and some larger trees would have bottom branches pruned off. Underburning would likely kill some of the smaller diameter merchantable trees, mainly grand fir and Douglas-fir that are not fire-resistant. Underburning in conjunction with bark beetle mortality would improve species composition and trend these stands toward the desired structure, but it would take several underburns over an extended period to achieve the more open stands desired.

Underburning on the remaining 604 acres would improve understory shrub and grass species composition for wildlife forage and maintain a more open stand structure.

Coeur d'Alene Lake Analysis Area

Prescribed fire would be utilized on approximately 340 acres within the Fernan (77 acres), Wolf Lodge (171 acres), and Cedar Creek (92 acres) watersheds. Of this amount, approximately 132 acres would occur in stands that contain ponderosa pine that would benefit from reduce competition with Douglas-fir and/or grand fir. In order to reduce fuel ladders that could potentially carry fire into the crowns of desirable trees, sub-merchantable (less than 7 inches in diameter) grand fir and Douglas-fir would be felled prior to burning and some larger trees would have bottom branches pruned off. Underburning would likely kill some of the smaller diameter merchantable trees, mainly grand fir and Douglas-fir that are not fire-resistant. Underburning in conjunction with bark beetle mortality would improve species composition and trend these stands toward the desired structure, but it would take several underburns over an extended period to achieve the more open stands desired.

Underburning on the remaining 208 acres would improve understory shrub and grass species composition for wildlife forage and maintain a more open stand structure.

Other Analysis Areas

No treatments are proposed in any of the other analysis areas, so effects would be as described in Alternative A.

Cumulative Effects at the Coeur d'Alene Project Area Scale

The following tables provide summary information on how each alternative would affect stand structure and species composition in each of the six analysis areas within the Coeur d'Alene Douglas-fir Beetle project area. Because the action alternatives would be expected to have little impact on beetle populations, the effect of the beetles on stand basal areas is expected to be the same for all alternatives. Even though green trees would be harvested in some stands in some alternatives, there are expected to be no changes in stand structure categories beyond that caused by the bark beetle so the stand structures resulting from Alternative A would also apply to all other alternatives. Changes in species composition from Douglas-fir and grand fir to ponderosa pine, white pine and larch would occur at the time of planting in harvested stands. These seral species would be expected to be managed throughout the life of the stand and would be therefore more likely to provide the desired mature and old forest structure than more root disease-susceptible species such as Douglas-fir and grand fir.

In the following tables, "Existing Condition" for Structural Stage and Cover Type incorporates all past activities that have occurred over the landscape, such as timber harvests, planting and fires; it also includes ongoing activities, such as active timber sales and associated planting. Changes shown to existing condition under each alternative would be the result of the proposed action and also of other reasonably foreseeable future actions. The only other reasonable foreseeable future actions which would affect stand structure and/or species composition on National Forest lands within the project area result from timber harvesting and planting associated with the Horizon Moon Timber Sale in the Wolf Lodge watershed of the Coeur d'Alene Lake analysis area. Refer to discussion of the Wolf Lodge watershed under Alternative A or to the discussion of Effects Common to All Alternatives for a detailed description.

Table III-16. Approximate acres of structural stages and cover types, Hayden analysis area.

	Existing		No Action		Alternative B		Alternative C		Alternative D		Alternative E		Alternative F		Alternative G	
Structural Stage	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]
Shrub/Seedling/Sapling	825	3	1,525	6	1,525	6	1,525	6	1,525	6	1,525	6	1,525	6	1,525	6
Pole/Small-medium Timber	20,200	78	19,700	76	19,700	76	19,700	76	19,700	76	19,700	76	19,700	76	19,700	76
Mature/Large Timber	4,800	18.5	4,600	17.5	4,600	17.5	4,600	17.5	4,600	17.5	4,600	17.5	4,600	17.5	4,600	17.5
Old Forest	175	.5	175	.5	175	.5	175	.5	175	.5	175	.5	175	.5	175	.5
Allocated old growth	143	.5	143	.5	143	.5	143	.5	143	.5	143	.5	143	.5	143	.5
Recruitment old growth	373	1.4	373	1.4	373	1.4	373	1.4	373	1.4	373	1.4	373	1.4	373	1.4
Cover Type																
Douglas-fir/ Grand fir	21,400	83	21,400	83	21,012	81	21,012	81	20,812	80	21,225	82	21,012	81	21,400	83
Western Hemlock	2,200	8	2,200	8	2,200	8	2,200	8	2,200	8	2,200	8.5	2,200	8	2,200	8
Ponderosa Pine	600	2	600	2	725	3	725	3	750	3	650	3	725	3	600	2
Western Redcedar	650	3	650	3	650	3	650	3	650	3	650	3	650	3	650	3
Subalpine Fir	200	1	200	1	200	1	200	1	200	1	200	1	200	1	200	1
Western Larch	450	2	450	2	575	2	575	2	600	2	500	2	575	2	450	2
Lodgepole Pine	300	1	300	1	300	1	300	1	300	1	300	1	300	1	300	1
Western White Pine	100	.5	100	.5	238	1	238	1	388	1.5	175	1	238	1	100	.5
Non-Forest	100	.5	100	.5	100	.5	100	.5	100	.5	100	.5	100	.5	100	.5

1 Percentage represents the percent of National Forest Land affected.

2 None of the action alternatives are expected to reduce bark beetle infestation levels so the information supplied for the No Action Alternative will be the same for all Alternatives.

3 Timber harvesting would not change structural stage beyond those changes caused by the Douglas-fir beetle so the information supplied for the No Action Alternative would be the same for all Alternatives.

Table III-17. Approximate acres of structural stages and cover types, Coeur d'Alene Lake analysis area.

	Existing		No Action		Alternative B		Alternative C		Alternative D		Alternative E		Alternative F		Alternative G	
Structural Stage	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]
Shrub/Seedling/Sapling	7,470	11.5	8,520	12	8,520	12	8,520	12	8,520	12	8,520	12	8,520	12	8,520	12
Pole/Small-medium Timber	32,570	50	32,420	50	32,420	50	32,420	50	32,420	50	32,420	50	32,420	50	32,420	50
Mature/Large Timber	24,350	37	23,475	36.5	23,475	36.5	23,475	36.5	23,475	36.5	23,475	36.5	23,475	36.5	23,475	36.5
Old Forest	1010	1.5	985	1.5	985	1.5	985	1.5	985	1.5	985	1.5	985	1.5	985	1.5
Allocated old growth	2,955	5	2,955	5	2,955	5	2,955	5	2,955	5	2,955	5	2,955	5	2,955	5
Recruitment old growth	2,630	4	2,630	4	2,630	4	2,630	4	2,630	4	2,630	4	2,630	4	2,630	4
Cover Type																
Douglas-fir/ Grand fir	50,200	77	49,825	76	49,716	76	49,716	76	49,647	76	49,805	76	49,751	76	49,825	76
Western Hemlock	2,500	4	2,500	4	2,500	4	2,500	4	2,500	4	2,500	4	2,500	4	2,500	4
Ponderosa Pine	3,250	5	3,375	5	3,425	5	3,425	5	3,425	5	3,395	5	3,395	5	3,375	5
Western Redcedar	3,725	5.5	3,725	5.5	3,725	5.5	3,725	5.5	3,725	5.5	3,725	5.5	3,725	5.5	3,725	5.5
Subalpine Fir	950	1.5	950	1.5	950	1.5	950	1.5	950	1.5	950	1.5	950	1.5	950	1.5
Western Larch	2675	4	2,800	4	2,800	4	2,800	4	2,850	4	2,800	4	2,800	4	2,800	4
Lodgepole Pine	350	.5	350	.5	350	.5	350	.5	350	.5	350	.5	350	.5	350	.5
Western White Pine	1,625	2.5	1,750	2.5	1,809	3	1809	3	1,828	3	1,750	2.5	1,779	2.5	1,750	2.5
Non-Forest	125	<.5	125	<.5	125	<.5	125	<.5	125	<.5	125	<.5	125	<.5	125	<.5

1 Percentage represents the percent of National Forest Land affected.

2 None of the action alternatives are expected to reduce bark beetle infestation levels so the information supplied for the No Action Alternative would be the same for all Alternatives.

3 Timber harvesting would not change structural stage beyond those changes caused by the Douglas-fir beetle so the information supplied for the No Action Alternative would be the same for all Alternatives.

Table III-18. Approximate acres of structural stages and cover types, Chain Lakes analysis area.

	Existing		No Action		Alternative B		Alternative C		Alternative D		Alternative E		Alternative F		Alternative G	
Structural Stage	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]
Shrub/Seedling/Sapling	1,425	8	1,725	10	1,725	10	1,725	10	1,725	10	1,725	10	1,725	10	1,725	10
Pole/Small-medium Timber	9,950	57	9,925	57	9,925	57	9,925	57	9,925	57	9,925	57	9,925	57	9,925	57
Mature/Large Timber	5,225	30	4,950	28	4,950	28	4,950	28	4,950	28	4,950	28	4,950	28	4,950	28
Old Forest	800	5	800	5	800	5	800	5	800	5	800	5	800	5	800	5
Allocated old growth	621	4	621	4	621	4	621	4	621	4	621	4	621	4	621	4
Recruitment old growth	788	5	788	5	788	5	788	5	788	5	788	5	788	5	788	5
Cover Type																
Douglas-fir/ Grand fir	13,225	76	13,225	76	13,070	75	13,070	75	13,068	75	13,171	76	13,070	75	13,225	76
Western Hemlock	1,050	6	1,050	6	1,050	6	1,050	6	1,050	6	1,050	6	1,050	6	1,050	6
Ponderosa Pine	500	3	500	3	550	3	550	3	550	3	525	3	550	3	500	3
Western Redcedar	1,400	8	1400	8	1,400	8	1,400	8	1,400	8	1,400	8	1,400	8	1,400	8
Subalpine Fir																
Western Larch	550	3	550	3	600	3.5	600	3.5	600	3.5	550	3	600	3.5	550	3
Lodgepole Pine																
Western White Pine	350	2	350	2	405	2.5	405	2.5	407	2.5	379	2	405	2.5	350	2
Non-Forest	325	2	325	2	325	2	325	2	325	2	325	2	325	2	325	2

1 Percentage represents the percent of National Forest Land affected.

2 None of the action alternatives are expected to reduce bark beetle infestation levels so the information supplied for the No Action Alternative would be the same for all Alternatives.

3 Timber harvesting would not change structural stage beyond those changes caused by the Douglas-fir beetle so the information supplied for the No Action Alternative would be the same for all Alternatives.

Table III-19. Approximate acres of structural stages and cover types, Steamboat analysis area.

	Existing		No Action		Alternative B		Alternative C		Alternative D		Alternative E		Alternative F		Alternative G	
Structural Stage	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]	Appx. Acres	%[1]
Shrub/Seedling/Sapling	1,025	11.5	1,025	11.5	1,025	11.5	1,025	11.5	1,025	11.5	1,025	11.5	1,025	11.5	1,025	11.5
Pole/Small-medium Timber	3,500	40	3,500	40	3,500	40	3,500	40	3,500	40	3,500	40	3,500	40	3,500	40
Mature/Large Timber	3,500	40	3,500	40	3,500	40	3,500	40	3,500	40	3,500	40	3,500	40	3,500	40
Old Forest	775	8.5	775	8.5	775	8.5	775	8.5	775	8.5	775	8.5	775	8.5	775	8.5
Allocated old growth	369	4	369	4	369	4	369	4	369	4	369	4	369	4	369	4
Recruitment old growth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cover Type																
Douglas-fir/ Grand fir	5,850	67	5,850	67	5,850	67	5,850	67	5,850	67	5,850	67	5,850	67	5,850	67
Western Hemlock	1,000	11	1,000	11	1,000	11	1,000	11	1,000	11	1,000	11	1,000	11	1,000	11
Ponderosa Pine	100	1	100	1	100	1	100	1	100	1	100	1	100	1	100	1
Western Redcedar	25	<.5	25	<.5	25	<.5	25	<.5	25	<.5	25	<.5	25	<.5	25	<.5
Subalpine Fir	150	2	150	2	150	2	150	2	150	2	150	2	150	2	150	2
Western Larch	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
Lodgepole Pine	850	10	850	10	850	10	850	10	850	10	850	10	850	10		
Western White Pine	425	5	425	5	425	5	425	5	425	5	425	5	425	5		
Cottonwood	225	2	225	2	225	2	225	2	225	2	225	2	225	2	225	2
Non-Forest	175	2	175	2	175	2	175	2	175	2	175	2	175	2	175	2

1 Percentage represents the percent of National Forest Land affected.

2 None of the action alternatives are expected to reduce bark beetle infestation levels so the information supplied for the No Action Alternative would be the same for all Alternatives.

3 Timber harvesting would not change structural stage beyond those changes caused by the Douglas-fir beetle so the information supplied for the No Action Alternative would be the same for all Alternatives.

Table III-20. Approximate acres of structural stages and cover types, Bumblebee analysis area.

	Existing		No Action		Alternative B		Alternative C		Alternative D		Alternative E		Alternative F		Alternative G	
Structural Stage	**Appx. Acres**	**%**	**Appx. Acres**	**%**	**Appx. Acres**	**%**	**Appx. Acres**	**%**	**Appx. Acres**	**%**	**Appx. Acres**	**%**	**Appx. Acres**	**%**	**Appx. Acres**	**%**
Shrub/Seedling/Sapling	2,050	16	2,150	16	2,150	16	2,150	16	2,150	16	2,150	16	2,150	16	2,150	16
Pole/Small-medium Timber	5,525	42	5,500	42	5,500	42	5,500	42	5,500	42	5,500	42	5,500	42	5,500	42
Mature/Large Timber	4,775	36	4,675	36	4,675	36	4,675	36	4,675	36	4,675	36	4,675	36	4,675	36
Old Forest	775	6	775	6	775	6	775	6	775	6	775	6	775	6	775	6
Allocated old growth	3	<1	3	<1	3	<1	3	<1	3	<1	3	<1	3	<1	3	<1
Recruitment old growth	280	2	280	2	280	2	280	2	280	2	280	2	280	2	280	2
Cover Type																
Douglas-fir/ Grand fir	10,225	78	10,225	78	10,206	78	10,206	78	10,142	77.5	10,206	78	10,225	78	10,225	78
Western Hemlock	1,150	9	1,150	9	1,150	9	1,150	9	1,150	9	1,150	9	1,150	9	1,150	9
Ponderosa Pine	100	1	100	1	100	1	100	1	100	1	100	1	100	1	100	1
Western Redcedar	500	4	500	4	500	4	500	4	500	4	500	4	500	4	500	4
Cottonwood	225	2	225	2	225	2	225	2	225	2	225	2	225	2	225	2
Western Larch	375	3	375	3	375	3	375	3	375	3	375	3	375	3	375	3
Lodgepole Pine	225	2	225	2	225	2	225	2	225	2	225	2	225	2	225	2
Western White Pine	225	2	225	2	244	2	244	2	308	2.5	244	2	225	2	225	2
Non-Forest																

1 Percentage represents the percent of National Forest Land affected.
2 None of the action alternatives are expected to reduce bark beetle infestation levels so the information supplied for the No Action Alternative would be the same for all Alternatives.
3 Timber harvesting would not change structural stage beyond those changes caused by the Douglas-fir beetle so the information supplied for the No Action Alternative would be the same for all Alternatives.

Table III-21. Approximate acres of structural stages and cover types, Hart analysis area.

	Existing		No Action		Alternative B		Alternative C		Alternative D		Alternative E		Alternative F		Alternative G	
Structural Stage	**Appx. Acres**	**%[1]**	**Appx. Acres**	**%[1]**	**Appx. Acres**	**%[1]**	**Appx. Acres**	**%[1]**	**Appx. Acres**	**%[1]**	**Appx. Acres**	**%[1]**	**Appx. Acres**	**%[1]**	**Appx. Acres**	**%[1]**
Shrub/Seedling/Sapling	1,500	8	1,800	10	1,800	10	1,800	10	1,800	10	1,800	10	1,800	10	1,800	10
Pole/Small-medium Timber	10,950	61	10,900	61	10,900	61	10,900	61	10,900	61	10,900	61	10,900	61	10,900	61
Mature/Large Timber	3,700	21	3,525	20	3,525	20	3,525	20	3,525	20	3,525	20	3,525	20	3,525	20
Old Forest	1,700	9	1,625	9	1,625	9	1,625	9	1,625	9	1,625	9	1,625	9	1,625	9
Allocated old growth	1,687	9	1,687	9	1,687	9	1,687	9	1,687	9	1,687	9	1,687	9	1,687	9
Recruitment old growth	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cover Type																
Douglas-fir/ Grand fir	12,950	72.5	12,950	72.5	12,769	71.5	12,769	71.5	12,750	71.5	12,845	72	12,806	72	12,950	72.5
Western Hemlock	2,425	13.5	2,425	13.5	2,425	13.5	2,425	13.5	2,425	13.5	2,425	13.5	2,425	13.5	2,425	13.5
Ponderosa Pine	200	1	200	1	250	1	250	1	250	1	225	1	250	1	200	1
Western Redcedar	125	1	125	1	125	1	125	1	125	1	125	1	125	1	125	1
Subalpine Fir																
Western Larch	450	2.5	450	2.5	500	3	500	3	500	3	475	3	495	3	450	2.5
Lodgepole Pine	625	3.5	625	3.5	625	3.5	625	3.5	625	3.5	625	3.5	625	3.5	625	3.5
Western White Pine	275	1.5	275	1.5	356	2	356	2	375	2	329	1	325	2	275	1.5
Cottonwood	300	1.5	300	1.5	300	1.5	300	1.5	300	1.5	300	1.5	300	1.5	300	1.5
Non-Forest	500	3	500	3	500	3	500	3	500	3	500	3	500	3	500	3

1 Percentage represents the percent of National Forest Land affected.
2 None of the action alternatives are expected to reduce bark beetle infestation levels so the information supplied for the No Action Alternative would be the same for all Alternatives.
3 Timber harvesting would not change structural stage beyond those changes caused by the Douglas-fir beetle so the information supplied for the No Action Alternative would be the same for all Alternatives.

As can be seen from the previous tables, changes in stand structure and species composition as a result of the proposed alternatives would affect only one to two percent of each analysis area. However, there would be improvements to long-term species composition and structure in some areas and with some alternatives.

Effects Common to All Alternatives

Harvest activities and subsequent reforestation efforts associated with the Horizon Moon Timber Sale will increase seral species composition by approximately 0.2 percent, but those stands are more likely to provide the desired old forest structure over the long term due to reforestation with early seral species.

Foreseeable Actions

The Horizon Moon Timber Sale is planned to sell within the next few years; this will have an impact on stand structure in the Wolf Lodge Creek watershed of the Coeur d'Alene Lake analysis area. This sale will include 151 acres of clearcuts, 178 acres of irregular group shelterwood, and 134 acres of seed tree harvests. The clearcuts and seed tree harvests will move stands from mature/large timber structural stage to seedling/sapling stage. The irregular group shelterwood harvests generally retain a substantial residual overstory over much of the stand. Approximately 90 acres of the irregular group shelterwood harvest will be considered in a seedling sapling stage after harvest.

The timber sale will decrease mature forest structure by about 0.2 percent of the Coeur d'Alene project area. However, approximately 375 acres that will be harvested in the Horizon Moon Timber Sale will be planted with early seral species. This will trend those stands toward the desired species composition, and those stands are also more likely to provide the desired long-term forest structure than more disease and insect susceptible grand fir and Douglas-fir.

There are also two salvage sales, Stella Ice and Huckleberry Ice, planned for the Wolf Lodge Creek watershed. These sales will have no impact on stand structure and will provide no opportunity for regeneration of early seral tree species, through either natural seeding or planting. The trees to be removed represent a small portion of each harvest area, and changes in canopy closure would be minimal.

Cumulative Effects on Private and Other Public Agency Lands

The effects of Douglas-fir beetle mortality on other ownership lands within the project area would be difficult to ascertain due to a lack of detailed information on current conditions and on how other land owners will treat beetle-killed trees. Harvests on BLM lands include 78 acres of salvage of dead and dying trees and planting of 40 acres of this area to early seral species. In very general terms, non-industrial forest owners and industrial forest owners are likely to aggressively harvest dead and dying trees because of their commercial value. Owners of small home sites and recreational property are less likely to harvest their timber. Private landowners that do harvest trees are less likely to invest money in reforestation, so most regeneration will be from natural seeding.

There would thus be little change in composition to early seral species. Private lands are less likely to provide old forest structure, since harvest is generally driven by economic considerations. Some mature forest is likely to be lost due to bark beetle mortality. Although it is impossible to predict exactly what will happen on private lands, it's probably safe to say that inherent disturbance regimes and historic ranges of variability in vegetation will never be returned on a landscape scale.

Alternative A

It is estimated that approximately 26,700 acres of National Forest lands within the project area will incur some mortality due to the current bark beetle epidemic. Most of this mortality will have little impact on stand

structure, but about 2,050 acres are projected to have a substantial (greater than 50 percent of the stand basal area) loss of forest tree cover. Natural regeneration of shade-tolerant species is expected to occur in these more heavily impacted areas, but there would be no change to the desired early seral species composition.

The stands of grand fir and Douglas-fir that have replaced white pine and larch in the ecosystem and that are encroaching on the ponderosa pine on drier sites are very susceptible to root disease. Some ponderosa pine and western larch stands may incur temporary benefits due to the mortality of Douglas-fir and resulting reduced competition. In the absence of further disturbance, however, these benefits would be expected to be lost as shade tolerant species regenerate and again dominate the stands. Increased fuel loading as a result of beetle-caused mortality and fuel ladders created by regeneration could put these stands at increased risk of stand replacing fires.

Currently, 8.1 percent of National Forest lands within the project area is dominated by early seral species including ponderosa pine, white pine and western larch, compared to an historic level of 57 percent. Alternative A would not increase the area in early seral species.

Currently, 30 percent of National Forest lands within the project area is in mature and old forest structural stages, compared to historic levels of 46 percent. The current beetle infestation will decrease the old and mature forest structure by approximately one percent. Since the species composition would not change under Alternative A, future stands would be susceptible to the same insect and disease pests as the existing stands. These stands would be unlikely to provide the same closed canopy, multi-storied mature and old forest structure containing large white pine and larch that was once a major component of the Coeur d'Alene subbasin. Although these stands may contain large old trees and provide some old growth characteristics, openings caused by root disease may be common, and a key component of remnant white pine and larch would be missing.

Alternative B

Early seral species would be planted in stands totaling approximately 852 acres. Because early seral species are less susceptible to root disease than Douglas-fir and grand fir, these stands would also be more likely to provide a long-term improvement in stand structure. Additionally, 9,379 acres would be selectively harvested to remove dead and dying trees. This type of harvest would not improve seral species composition or affect forest structure.

Timber harvest and associated reforestation efforts resulting from Alternative B would improve species composition on about 0.6 percent of National Forest lands within the project area. There would be no additional decrease in mature and old forest structure beyond that caused by the current beetle infestation. Not all beetle-created openings would be harvested and planted; those stands planted with early seral species would be more likely to provide the same old forest structure, containing large white pine and larch, which was once a major component of the Coeur d'Alene River subbasin.

Alternative C

Cumulative effects at the project area level would be essentially the same as those under Alternative B.

Alternative D

Early seral species would be planted on approximately 1,176 acres, and harvests that improve existing ponderosa pine and western larch stands would be completed on about 1,161 acres. These stands would be more likely to provide a long-term improvement in stand structure, since early seral species are less susceptible to root disease than Douglas-fir and grand fir. Dead tree removal and thinning in ponderosa pine and larch stands would create conditions where these areas would be at reduced risk of stand replacing fires. Additionally, 9,886 acres would be selectively harvested to remove dead and dying trees. This type of

harvest would not improve seral species composition or affect forest structure. Prescribed fire would be utilized on approximately 1,628 acres to improve forage for big game animals.

Timber harvest and associated reforestation efforts would improve species composition on about 0.8 percent of National Forest lands within the project area. An additional 0.8 percent would be treated to improve future stand structure through thinning and improvement harvests. There would be no additional decrease in mature and old forest structure beyond that caused by the current beetle infestation. Not all beetle-created openings would be harvested and planted; those stands planted with early seral species would be more likely to provide the same old forest structure, containing large white pine and larch, which was once a major component of the Coeur d'Alene River subbasin. Vegetation that provides forage for big game would be improved on approximately one percent of the project area through the use of prescribed fire.

Alternative E

Early seral species would be planted on approximately 373 acres where bark beetles and subsequent harvest of dead and dying trees have created adequate openings for seedling establishment and growth, and where site preparation activities can be accomplished with minimal losses to residual green trees. These planted stands would be more likely to provide a long-term improvement in stand structure, since early seral species are less susceptible to root disease than Douglas-fir and grand fir. An additional 9,858 acres would be selectively harvested to remove dead and dying trees, but no planting would occur. Of this 9,858 acres, approximately 573 acres would be in openings that would be allowed to naturally regenerate. This type of harvest would not improve seral species composition or long-term stand structure.

Timber harvest and associated reforestation would improve species composition on about 0.2 percent of National Forest lands within the project area. There would be no additional decrease in mature and old forest structure beyond that caused by the current beetle infestation. Not all beetle-created openings would be harvested and planted; those stands planted with early seral species would be more likely to provide the same old forest structure, containing large white pine and larch, which was once a major component of the Coeur d'Alene River subbasin.

Alternative F

Early seral species would be planted on approximately 761 acres. These stands are also more likely to provide a long-term improvement in stand structure since early seral species are less susceptible to root disease than Douglas-fir and grand fir. Additionally, 7,275 acres would be selectively harvested to remove dead and dying trees. Increased treatment of fuels within harvest units may provide increased protection from stand replacing fires. Prescribed fire would be utilized on approximately 1,628 acres to improve forage for big game animals.

Timber harvest and associated reforestation would improve species composition on about 0.5 percent of National Forest lands within the project area. There would be no additional decrease in mature and old forest structure beyond that caused by the current beetle infestation. Not all beetle-created openings would be harvested and planted; those stands planted with early seral species would be more likely to provide the same old forest structure, containing large white pine and larch, which was once a major component of the Coeur d'Alene River subbasin. Vegetation that provides forage for big game would be improved on approximately one percent of the project area through the use of prescribed fire.

Alternative G

Prescribed fire would be used to treat about 1,115 acres. Approximately 304 acres that contain a substantial component of ponderosa pine would be trended toward the desired forest structure and there would be an improvement in species composition through a reduction in competing understory shade tolerant species. However, additional treatments in future years would be necessary to attain the desired condition. A total of

811 acres would be treated to maintain forage in areas that provide winter range for deer and/or elk. Desirable brush, grass and forb species would be encouraged while invading conifers and older brush would be killed.

Prescribed fire would trend approximately 0.2 percent of the project area toward the desired tree species composition and forest structure. Vegetation that provides forage for big game would be improved on approximately 0.5 percent of the project area.

Effects of Opportunities on All Alternatives

Precommercial Thinning and Pruning - Opportunities for vegetation restoration include 1,650 acres of precommercial thinning and 173 acres of white pine pruning as identified in Chapter II. The effect of these treatments would be to improve the growth and vigor of trees planted after past regeneration harvests or natural regeneration that resulted after past harvests. Precommercial thinning stands are prioritized to treat those stands with a large component of early seral species first. This would allow these species to better compete with the more shade-tolerant species so they can better provide the desired forest structure and composition. Even though early seral species are favored during thinning operations, other species are also maintained in the stands.

Pruning of white pine improves their ability to survive infection by white pine blister rust. Opportunities to prune white pine are applicable to all alternatives. Pruning provides a better opportunity for both planted, rust resistant and naturally regenerated white pine to reach maturity and contribute to the desired forest structure and composition.

Watershed and Wildlife Restoration - Roads proposed for permanent closure or obliteration in some action alternatives would eventually provide forest cover, although they would be likely to go through a prolonged period of grass, forb and/or shrub dominance. Closure of some roads would restrict access to some areas, making stand-tending operations such as pruning and precommercial thinning more difficult.

Ecosystem Burning - In some action alternatives, burning to restore or maintain wildlife browse is identified as an opportunity. Stands that are currently dominated by shrubs, grasses and/or forbs with a few scattered large trees would be maintained in this structural stage by killing invading trees in the smaller size classes and rejuvenating new growth beneficial to wildlife. Other stands planned for underburning have a denser forest canopy (usually of ponderosa pine), but are still open enough to provide for the growth of shrubs, grasses and forbs. Underburning would maintain these more open forested conditions by killing invading shade-tolerant species. An additional benefit may be to provide a seed bed for regeneration and establishment of some early seral tree species. Underburning may stress some overstory trees, making them more susceptible to insect and disease attack. Non-forested shrub/grasslands and open-canopy ponderosa pine stands are important elements in the ecosystem that are below historic levels (IPNF 1998).

Noxious Weed Treatments - Direct control of noxious weeds and management practices designed to prevent their spread or introduction to additional areas would improve the potential for natural vegetation to colonize disturbed sites but would probably not affect forest tree vegetation.

Consistency With the Forest Plan and Other Applicable Regulatory Direction

Forest Plan direction provides that timber management activities will be the primary process used to minimize the hazards of insects and diseases and will be accomplished by maintaining stand vigor and diversity of plant communities and tree species.

In most stands proposed for harvest, only dead and dying trees would be designated for removal. This is consistent with Forest Plan direction that stands which are "substantially damaged by fire, windthrow, insect

or disease attack, or other catastrophe may be harvested where the salvage is consistent with silvicultural and environmental standards".

Regeneration harvests are proposed for stands in which the majority of the trees have been killed. Following site preparation, usually underburning, regenerated stands would be planted with seral species (white pine, larch, and ponderosa pine) to promote stand structures and species composition which reduce susceptibility to insect and disease damage. This is consistent with forest plan direction that "regeneration with species combinations that are least susceptible to root disease is the primary protection objective for the root rot diseases" and that "reforestation will feature seral tree species". All stands proposed for regeneration harvests are on lands suitable for timber production and can be adequately restocked within 5 years of the final harvest. In accordance with Forest Plan direction, stands would be regenerated with trees from seed that is well-adapted to the specific site conditions and will be regenerated with a variety of species.

Improvement harvest and commercial thinning are proposed for some stands in some alternatives where ponderosa pine or western larch are a major component. The purpose is to improve vigor of the remaining trees and to maintain or enhance the diversity of plant communities. The Forest Plan for the IPNFs states that planting, precommercial thinning, and commercial thinning will be an integral part of management of future timber stands.

The Forest Plan directs that creation of openings larger than 40 acres must conform with current Regional guidelines regarding public notification, environmental analysis and approval. The DEIS informed the public that opening of greater than 40 acres would be created. As disclosed in the Regional guide and NFMA, the 40-acre limitation does not apply to areas harvested as a result of natural catastrophic conditions such as fire, insect and disease attack, or windstorm.

All alternatives are consistent with Forest Plan direction.

The National Forest Management Act (NFMA) provides that timber harvest and other silvicultural practices shall be used to prevent damaging population increases of forest pest organisms and treatments shall not make stands susceptible to pest-caused damage levels inconsistent with management objectives. All stands proposed for regeneration harvests are on lands suitable for timber production and could be adequately restocked within five years of the final harvest.

Improvement harvest and commercial thinning are proposed for some stands in some alternatives where ponderosa pine or western larch are a major component. The purpose is to improve vigor of the remaining trees and to maintain or enhance the diversity of plant communities. NFMA provides for these treatments where they increase the growth rate of residual trees, favor commercially valuable species, favor species valuable to wildlife, or achieve some other multiple use objective.

THREATENED, ENDANGERED AND SENSITIVE PLANTS

CHANGES BETWEEN THE DRAFT AND FINAL EIS

Several changes have been made between the Draft EIS and Final EIS. For TES plants, the most significant change has been that, since the release of the Draft EIS, a new Regional Forester's sensitive species list has been signed (March 10, 1999). In addition, the IPNFs have developed a list of Forest Species of Concern (see definition below). Prior to the signing of the new list, analysis of sensitive plants addressed species on both the old and proposed lists. For the Final EIS, species which do not appear on the new (March 1999) list and which are not recognized as Forest Species of Concern are not addressed. Species which were not on the proposed sensitive plant list but which were late additions to the new list are addressed in the Final EIS.

Changes in some harvest prescriptions and harvest acres have precipitated changes in some of the acreages in the tables. The changes were minor and did not result in a difference in the determination of effects.

Alternative G was added to the Final EIS; its direct, indirect and cumulative effects on sensitive plants were analyzed.

The Biological Assessment for Threatened and Endangered species is now in the project file for the Final EIS. Accordingly, Threatened and Endangered plant species have been addressed in this section.

REGULATORY FRAMEWORK

Federal legislation, regulations, policy and direction that require protection of species and population viability, evaluation and planning process consideration of threatened, endangered and other rare (Forest Service "sensitive") plants species include the Endangered Species Act (1973) as amended; the National Forest Management Act (1976); the National Environmental Policy Act (1969); Forest Service manual (2672.1-2672.43); Idaho Panhandle National Forests, Forest Plan (1987); and direction from the Regional Watershed, Wildlife, Fisheries and Rare Plants program and Washington Office.

AFFECTED ENVIRONMENT

Threatened and Endangered Plant Species

A threatened species, as determined by the US Fish and Wildlife Service, is any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Currently, the US Fish and Wildlife Service (USDI 1999) list two species as threatened for the Idaho Panhandle National Forests, water howellia (*Howellia aquatilis*) and Ute ladies'-tresses (*Spiranthes diluvialis*). There are no documented occurrences of these species on the Idaho Panhandle National Forests, although suitable habitat is suspected to occur. The recent Douglas-fir beetle outbreak has not affected suitable habitat for water howellia or Ute's ladies'-tresses. There is no proposed treatment within or adjacent to potentially suitable habitat for water howellia. It was determined that implementation of any alternative would have no effect on water howellia or Ute ladies'-tresses or their habitat. Refer to the Biological Assessment in the project file for more information on water howellia and Ute ladies'-tresses.

There are no Federally listed endangered plants for the Idaho Panhandle National Forests.

Sensitive Plant Species and Forest Species of Concern

The subbasins of northern Idaho contain a wide array and diversity of habitats and plant communities, many of which contain plant species that are known or thought to be rare. Of the estimated 1,200 to 1,500 plant species known or thought to occur here, about 10% are considered rare or uncommon.

Sensitive species are determined by the Regional Forester as those species for which population viability is a concern, as indicated by a current or predicted downward trend in population numbers or in habitat capability which would reduce the species' existing distribution. The Northern Regional Forester's sensitive species list for the IPNF contains 63 plant species. Certain species are known to occur only within certain subbasins, while others are known throughout the IPNF. Twenty-nine species of sensitive plants are known or suspected to occur within the Coeur d'Alene subbasin.

Plant species identified as "Forest species of concern" are species which may not be at risk on a rangewide, regional or state scale, but may be imperiled within a planning area, such as a National Forest (USDA 1997). Forest species of concern are addressed in effects analysis to provide for maintenance of population viability as directed in NFMA. Biological Evaluations are not required to address Forest species of concern. A discussion of habitats for Forest species of concern is included within the discussion of rare plant guilds. A complete list of sensitive species and Forest species of concern and is included in Appendix B.

Sensitive plants and Forest species of concern can be assigned to one or more rare plant guilds. These guilds are artificial assemblages based on similar habitat requirements used for the purpose of analysis. For the Idaho Panhandle National Forests, the rare plant guilds are aquatic, deciduous riparian, peatland, cold forest, wet forest, moist forest, dry forest and subalpine. Rock seeps and springs are microsites that can support certain sensitive plants; however, these can occur across all guilds and are not identifiable at a coarse scale (see Appendix B for specific plant guild descriptions).

This assessment describes the extent of all rare plant guilds in the analysis areas. Discussion of effects will focus on the wet, moist and dry forest guilds, as these are the habitats most likely to be affected by Douglas-fir beetles and proposed activities.

Assessment of sensitive species, Forest species of concern and suitable habitat occurrence was accomplished through review of the Coeur d'Alene River Ranger District sensitive plant records, Idaho Department of Fish and Game Conservation Data Center (ICDC 1998) element occurrence records, National Wetlands Inventory maps, timber stand examination records, aerial photographs and topographical maps, past field visits, personal knowledge and professional judgement of the project area by the District botanists and the IPNF Forest Botanist.

Previously documented occurrences of the following sensitive plant species and Forest species of concern (ICDC 1998) within the project area indicate that these species/guilds have a high probability of occupying unsurveyed highly suitable habitat. The following tables list plant occurrences by analysis area. There are no documented occurrences of threatened, endangered, sensitive, or Forest plant species of concern in the Steamboat or Hart analysis areas.

Table III-22. Sensitive plant and Forest species of concern (*) occurrence in the Hayden Analysis Area, Coeur d'Alene River Ranger District.

Rare Plant Guild	Species	Occurrences
Moist Forest/Wet Forest	Henderson's sedge	10
Peatland	Hypericum majus	1
Totals	**2 species**	**11 occurrences**

Table III-23. Sensitive Plant and Forest Species of Concern Occurrence in the Coeur d'Alene Lake Analysis Area, Coeur d'Alene River Ranger District.

Rare Plant Guild	Species	Occurrences
Moist/Wet Forest	Henderson's sedge	13
Moist/Wet Forest	round leaved rein orchid*	2
Moist/Wet/Dry Forest	clustered lady's slipper	1
Moist/Wet Forest	phantom orchid*	3
Dry Forest	bank monkeyflower*	1
Totals	**5 species**	**20 occurrences**

Table III-24. Sensitive Plant and Forest Species of Concern Occurrence in the Chain Lakes Watershed, Coeur d'Alene River Ranger District.

Rare Plant Guild	Species	Occurrences
Moist Wet/Forest	triangle moonwort	1
Dry Forest	bank monkey flower*	2
Aquatic	water clubrush	1
Peatland/aquatic	**many-fruit-false loosestrife***	1
Deciduous riparian/peatland	**eyed ruffle lichen***	1
Totals	**5 species**	**6 occurrences**

Table III-25. Sensitive Plant and Forest Species of Concern Occurrence in the Bumblebee Watershed, Coeur d'Alene River Ranger District.

Rare Plant Guild	Species	Occurrences
Moist Forest/Wet Forest	Henderson's sedge	2
Moist Forest/Wet Forest	round leaved rein orchid*	3
Totals	**2 species**	**5 occurrences**

Aquatic, deciduous riparian and **peatland** guild sensitive species within the analysis areas do not occur in any areas affected by bark beetle attack; no harvest or project-related activities are proposed in or adjacent to any known sensitive plant occurrences within these guilds.

Extent and Type of Suitable Habitat

Queries of the Timber Stand Data Base (TSMRS) based on the current information regarding preferred habitat and successional state for species within the different guilds were run for the project area. These queries indicate the amount of suitable rare plant habitat that may be present in the area. This information was further refined using other data sources. Site-specific information from the Timber Stand Management Records System (TSMRS), National Wetland Inventory maps, aerial photos, existing habitat and survey information, personal knowledge and professional judgement also was considered in the identification of highly suitable habitat for the rare plant guilds.

The project area includes suitable habitat for rare plant species of the deciduous riparian, aquatic, subalpine, wet, moist, peatland and dry forest guilds. Peatland, deciduous riparian, aquatic, and subalpine habitat, though present, would not be affected by the action of the Douglas-fir beetle, in Alternative A (No Action), or by any activities proposed in the action alternatives. More information on these guilds is contained in

Appendix B, TES Plants, Final EIS. Refer to Features Common to All Action Alternatives (Chapter II) for required buffers of aquatic, deciduous riparian and peatland habitats.

The following sections describe the extent and type of suitable habitat for sensitive plants and Forest species of concern present in each analysis area, as well as known occurrences. A detailed description of the IPNF rare plant guilds/species is contained in Appendix B.

There is abundant habitat for moist, dry, and wet forest guild species in the analysis areas (see Table III-26 below). Moist and dry forest habitats and species have the greatest potential to be affected by proposed harvest activities, as these are the habitats most affected by the Douglas-fir beetles. Wet forest habitats occupy limited acreage within the analysis areas and in proposed harvest units. As stated in Chapter II (Features Common to all Action Alternatives), Riparian Habitat Conservation Area guidelines effectively exclude most wet forest habitat from timber harvest. New road construction, road obliteration and prescribed fire activities have the potential to impact wet forest and riparian habitats and species.

Wet and Moist Forest Guilds

The wet forest guild is generally found in mid- to late-seral forest of the hemlock and redcedar habitat series, usually in riparian areas. Some of the associated species are devils club (*Oplopanax horridum*), oakfern (*Gymnocarpium dryopteris*), and lady fern (*Athyrium filix-femina*). Many sensitive plants, particularly coastal disjunct species, are found in wet forest habitats. Many of these species may also be found in moist forest habitats, with associated species such as queencup beadlily (*Clintonia uniflora*) and ginger (*Asarum caudatum*); therefore, they are included in the moist guild as well. There are 12 sensitive species of wet and moist forest habitats that are likely to occur in the project area. These species include deerfern (*Blechnum spicant*), moonworts (*Botrychium lanceolatum, B. minganense, B. paradoxum, B. pinnatum, and B. simplex*), Henderson's sedge (*Carex hendersonii*) Constance's bittercress (*Cardamine constancei*), clustered lady's slipper (*Cypripedium fasciculatum*), and Idaho barren strawberry (*Waldsteinia idahoensis*). The sensitive species maidenhair spleenwort (*Asplenium trichomanes*), and chickweed monkey flower (*Mimulus alsinoides*) may also occur in rock seep microsites within moist/wet forests.

Seven sensitive species known only from wet habitats may occur within the project area, including certain moonwort species (*Botrychium ascendens, B. crenulatum, B. montanum, B. pedunculosum*), green bug-on-a-stick moss (*Buxbaumia viridis*), clear moss (*Hookeria lucens*), and Sierra woodfern (*Thelypteris nevadensis*). Wet forest habitat represents less than five percent of the total project area acreage.

There are three Forest species of concern found in moist to wet forest habitats that are either documented in the project area or have a high likelihood to occur there based on the proximity of known occurrences and the presence of suitable habitat. These include phantom orchid (*Eburophyton austiniae*), round-leaved rein orchid (*Platanthera orbiculata*) and western starflower (*Trientalis latifolia*).

Sensitive Species

Maidenhair spleenwort (*Asplenium trichomanes*) occurs in moist, rocky cliff crevices and talus slopes (Lorain 1989). The most likely habitat is shaded moist to wet cedar/hemlock forest at low elevations. There are two known extant occurrences in the state of Idaho, north of the project area in the Kootenai River valley. This species *may* occur in the analysis areas where harvest and/or project-related activities are proposed.

Moonworts (*Botrychium ascendens, B. crenulatum, B. lanceolatum, B. minganense, B. montanum, B. paradoxum, B. pedunculosum, B. pinnatum, and B. simplex*) are fern-like plants that are found in a variety of habitats ranging from damp meadows and boggy areas to moist coniferous western hemlock and cedar forest (Lorain 1990). On the IPNF they occur most often on shallow sloped sites in densely shaded moist to wet forest habitats. Triangle moonwort (*Botrychium lanceolatum*) is the only moonwort species that is documented from the project area; it occurs in the Chain Lakes analysis area.

Two sensitive moss species of wet forest habitats *may* occur in the project area. Suitable habitat for **green bug-on-a-stick moss** (*Buxbaumia viridis*) consists of highly shaded, mid- to late seral, wet forest habitats on rotting logs. **Clear moss** (*Hookeria lucens*) is known from wet cedar forests in British Columbia and the Clearwater and Nez Perce National Forests in Idaho (Moseley and Pitner 1996).

Constance's bittercress (*Cardamine constancei*) is an Idaho endemic species most likely to occur in partly shaded riparian areas and moist cedar/hemlock forest below 4,000 feet. It occurs outside the project area approximately seven miles south of the Bumblebee analysis area.

Henderson's sedge (*Carex hendersonii*) has the greatest number of occurrences for sensitive plants present in the project area, occurring in the Hayden, Coeur d'Alene, and Bumblebee analysis areas. This is a coastal disjunct species which prefers moist microsites in grand fir to western hemlock/redcedar forest, often occurring in riparian communities below 3,000 feet elevation.

Clustered lady's slipper (*Cypripedium fasciculatum*) is a mycorrhizal dependent species of orchid. While it is often found in moist to wet cedar/hemlock forests and grand fir forest, it is also being found increasingly in drier habitats, therefore it is also considered a member of the **dry forest guild**. In the Coeur d'Alene analysis area there are two documented occurrences: one in dry forest on private land west of Coeur d'Alene Lake, and one historic occurrence reported from the Fernan Hill area, which has not been relocated (ICDC 1998). This species is likely to be present in suitable habitat in other portions of the project area.

Sierra woodfern (*Thelypteris nevadensis*) is a Pacific coastal disjunct species that occurs in moist woods, seepages or springs, damp meadows, and streambanks from foothills to middle altitudes in the mountains (Lorain 1989). The nearest occurrences to the project area are on the Clearwater National Forest. This sensitive species *may* occur in suitable wet forest habitat in the analysis areas.

Forest Species of Concern

Round-leaved rein orchid (*Platanthera orbiculata*) occurs in the Coeur d'Alene and Bumblebee analysis area. It prefers moist to wet, shaded, western hemlock/redcedar forest with a rich humus layer. This species, like other orchids, is dependent on soil fungi (mycorrhizae) for growth and reproduction.

Phantom orchid (*Eburophyton austiniae*), another mycorrhizal species, is found in habitats similar to round leaved rein orchid. There are several occurrences on the Ranger District, and three occurrences in the Coeur d'Alene analysis area.

Western starflower (*Trientalis latifolia*) is found primarily on the Pacific coast, with disjunct populations in northern Idaho. Western starflower grows in low elevation river canyons associated with moist, partly to fully shaded habitats within the western redcedar/hemlock zone (Lichthardt and Moseley 1994). This species occurs in close proximity to the project area two miles north of the Bumblebee Analysis Area.

Dry Forest Guild

The Dry Forest Guild encompasses sites occupied by relatively open stands of ponderosa pine and Douglas-fir with associated species such as ninebark (*Physocarpus malvaceus*), oceanspray (*Holodiscus discolor*), pinegrass (*Calamagrostis rubescens*), and bluebunch wheatgrass (*Agropyron spicatum*) to grand fir/ninebark occupied sites. Sites may be steep sloped and include microsites of rock or rock outcrops. Two sensitive species of the dry forest guild with a high likelihood of occurrence in unsurveyed highly suitable habitat include **clustered lady's slipper** (*Cypripedium fasciculatum*) and **chickweed monkeyflower** (*Mimulus alsinoides*). In addition, one Forest species of concern, **bank monkeyflower** (*Mimulus clivicola*) is also known from the project area, and has the potential to occur there.

Sensitive Species

Clustered lady's slipper (*Cypripedium fasciculatum*), with occurrences in the Coeur d'Alene analysis area, can be found in dry forest habitats as well as moist and wet forests. Suitable dry forest habitat consists of ponderosa pine/Douglas-fir, and grand fir forest with ninebark (*Physocarpus malvaceus*) and oceanspray (*Holodiscus discolor*) as associated species.

Chickweed monkeyflower (*Mimulus alsinoides*) is known from the St. Joe District and may occur in suitable dry forest habitats within the project area. Suitable habitat for the species includes moist, seepy rock cliffs within otherwise dry habitats, as in bank monkeyflower, described above.

Forest Species of Concern

Bank monkeyflower (*Mimulus clivicola*) occurs in the Coeur d'Alene and Chain Lakes analysis areas in dry openings in ponderosa pine/Douglas-fir forest. Common associates are ninebark (*Physocarpus malvaceus*), oceanspray (*Holodiscus discolor*), and bluebunch wheatgrass (*Agropyron spicatum*). This species is found on south aspects of generally greater than 60 percent slope.

Table III-26. Rare plant guilds with potential for effects, by analysis area.

Analysis area	Rare Plant Guild	Total suitable habitat in analysis area (acres)	% of analysis area in suitable habitat
Hayden	Moist Forest	3,212	10%
	Wet Forest	132	<1%
	Dry Forest	1,888	6%
Coeur d'Alene	Moist Forest	19,099	27%
	Wet Forest	295	<1%
	Dry Forest	3,835	5%
Chain Lakes	Moist Forest	3,913	21%
	Wet Forest	83	<1%
	Dry Forest	2,899	15%
Bumblebee	Moist Forest	4,625	34%
	Wet Forest	79	<1%
	Dry Forest	356	3%
Steamboat	Moist Forest	1,907	22%
	Wet Forest	1	<1%
	Dry Forest	757	9%
Hart	Moist Forest	1,331	7%
	Wet Forest	0	0%
	Dry Forest	1,293	7%
Totals for the Douglas-fir Beetle project area	**Moist Forest** **Wet Forest** **Dry Forest**	**34,087** **590** **11,028**	**21%** **>1%** **7%**

* *Table acreage and % area pertains to National Forest System Lands only.*

Current and Potential Threats to Documented Sensitive Plants, Forest Species of Concern and Highly Suitable Habitat

Peatland Guild

There are no known current threats to the documented occurrences of peatland guild species or their habitats. Future threats could include invasion of wetlands by weeds such as orange and meadow hawkweed and/or common tansy. Future management activities which would significantly alter the hydrology of peatlands in the analysis areas could also imperil sensitive peatland species. Upland logging and road construction and grazing in wet meadows adjacent to peatland habitats could increase sediment and nutrient delivery, eventually changing floristic composition and leading to the extirpation of some sensitive species (Bursik and Moseley 1995).

The risk of fire in peatlands is difficult to gauge. Previous coring of peat in some north Idaho wet meadows reveals several charcoal layers and indicates that sporadic wildfires have occurred in these habitats (Niehoff 1998). These infrequent fires were probably surface burns that did not consume deep layers of peat (Niehoff 1998).

Given the history of wildfire within the analysis areas, peatland habitats there may have experienced fires following a succession of very dry years. These fires would likely have been of low to moderate intensity. If so, such fires would be considered to be within the historic range of variability for those habitats. It is not known if peatlands within the analysis areas have ever dried out sufficiently to experience a high-intensity wildfire that would burn deep into the peat layer.

Aquatic and Deciduous Riparian Guilds

There are no known current threats to species or habitats of these guilds. The greatest potential threat to these guilds is the invasion of exotic species which could displace native vegetation and lead to extirpation of some sensitive species. Any activity or event which caused broad-scale soil and/or vegetation disturbance in or adjacent to these habitats would increase the risk of invasion by noxious weeds. Weed species of concern for these guilds include purple loosestrife (*Lythrum salicaria*), Eurasian water-milfoil (*Myriophyllum spicatum*) and common tansy (*Tanacetum vulgare*).

Subalpine Guild

There are no known current or potential threats to species or habitats of this guild within the analysis areas.

Wet and Moist Forest Guilds

Long-term studies, recent population monitoring and informal observation indicate that sensitive species occurring in these guilds exhibit varying degrees of tolerance to disturbance of soil, vegetation and/or canopy cover. Threats to documented occurrences from these guilds are as follows:

Henderson's sedge (*Carex hendersonii*): Henderson's sedge is a species of low elevations (less than 3,000 feet) that inhabits boggy areas or moist woods (Lorain 1988). The habitats this sensitive species favors are subject to current and potential threats including grazing, road construction, timber harvest, and recreational uses. Part of the Coeur d'Alene Lake analysis area, including occurrences and suitable habitat for Henderson's sedge, is within the Iron-Mokins grazing allotment. Light grazing has been observed on Henderson's sedge (Goodnow 1998, England 1998), but did not appear to be negatively affecting plant vigor. Future threats to this species include beetle activity and harvest that would significantly decrease canopy cover and activities causing severe soil disturbance. Underburning is a potential threat to Henderson's sedge plants. Though, in general, fire intensity from underburning is predicted to be low, isolated areas of higher fuel loading could burn hotter, possibly having direct effects to individuals peripheral to the population and highly suitable

habitat. Monitoring studies done on the Clearwater National Forest (Lichthardt 1998) indicate this species has the ability to recover from timber harvest over time, but are inconclusive in terms of Henderson's sedge response to burning in conjunction with harvest.

Moonworts (*Botrychium spp.*): Current threats to the occurrences of sensitive moonworts in the analysis areas include possible trampling and browsing by wildlife, competition and habitat loss due to noxious weed invasion, and recreation related disturbance. Future threats to sensitive moonworts could include activities or events which would destroy the plants, underground rhizomes or soil mycorrhizae, or which would significantly reduce canopy cover in the plants' habitat. Such activities and events include ground based timber harvest and fuels treatment, canopy reduction, wildfire and prescribed underburning.

Round-leaved rein orchid (*Platanthera orbiculata*), **clustered lady's slipper** (*Cypripedium fasciculatum*), and **phantom orchid** (*Eburophyton austiniae*): Dependence of these orchid species on soil mycorrhizal relationships indicates a low tolerance for activities or events which would disrupt those relationships. Stand-replacing wildfire or prescribed burning, as well as ground-based harvest or fuels treatment, could cause sufficient duff removal and soil disturbance to destroy mycorrhizal fungi on which these species depend. Round-leaved rein orchid and phantom orchid are addressed in this analysis as Forest species of concern.

Dry Forest Guild

Known occurrences of dry forest guild species in the project area include bank monkeyflower and clustered lady's slipper. Clustered lady's slipper is also considered as a Wet and Moist Guild species, and has already been discussed.

Bank monkeyflower (*Mimulus clivicola*): Current threats to bank monkeyflower include grazing and the spread of noxious weeds into susceptible dry forest habitats from livestock and vehicles. Future threats include proposed timber harvest and prescribed fire applied in the springtime, outside the natural range of variability. The long term effects of prescribed fire on bank monkeyflower are not known. While bank monkeyflower is adapted to disturbed mineral soils, large scale erosion could eliminate populations (Lorain 1993). Disturbance from timber harvest can lead to introduction of highly competitive weeds that could threaten populations. This species has been found to be more prevalent throughout its range in Idaho than previously believed, with relatively few threats ; it has recently been removed from the IPNF sensitive species list and placed on the Forest species of concern list.

Previous Plant Surveys

Approximately 2,400 acres of rare plant field surveys have been done for unrelated projects in the analysis areas. These are documented in project files. Some past surveys occurred in areas proposed for activities in this assessment, and may be utilized for clearance purposes. No sensitive plant surveys have yet been conducted specifically for this project. Surveys are planned to commence in the spring of 1999, to be completed prior to project implementation. The Coeur d'Alene River Ranger District is committed to carrying out features and mitigation measures as specified in NEPA documents. Examples of recent projects for which sensitive plant surveys were completed after the Decision, but prior to implementation include Happy Hog, Skookum Salvage, and Barney Rubble's Cabin (1996), and Icestorm Salvage (1997). Survey documentation is located in the respective project files.

Features for Threatened, Endangered and Sensitive plants (Chapter II) and Required Mitigation and Recommended Protection Measures (Chapter III), provide for field surveys to be completed in all previously unsurveyed areas of highly suitable habitat where high risk activities for sensitive plants would take place. All surveys would be completed prior to project implementation. Regional direction (Leonard 1992) states that the need for and extent of field reconnaissance should be commensurate with the risk associated with the project and species involved, and the level of knowledge already in hand. Refer to Features Common to All Action Alternatives (Chapter II) for survey requirements prior to project implementation.

Changes from Historic Conditions in Sensitive Plant Habitat

The current condition of the vegetation in the project area has changed, in many respects, as compared to the historic condition. Some of the most significant changes to vegetation that have occurred with respect to sensitive plants are: loss of riparian habitats, fragmentation of habitat by timber harvest , and introduction of numerous non-native plant species, many of which are listed as State "noxious" weeds (IPNF 1998). Studies of the Coeur d'Alene River Basin (IPNF 1998) show that large areas of mature and old growth timber have been fragmented by timber harvest blocks of 20 to 100 acres in size. Although the total amount of mature forest hasn't changed much from historic levels, mature stands now tend to occur in long narrow stringers with more edge. Old growth forest has declined significantly from historic levels. For many of the Coeur d'Alene sensitive plants suitable habitat consists of late seral, or old growth forest in wet to moist habitat type series. Currently about 41 percent of these habitats remain intact. Overall, habitat is fragmented, thus decreasing recolonization opportunities for rare plants from existing populations. One of the more important implications of habitat loss and fragmentation is the reduced ability of sensitive plants to respond to random events or disturbances in the environment, whether these be natural or human-caused.

Riparian areas are some of the most altered habitats in the Coeur d'Alene Basin. These areas served as natural travel corridors for early settlers and later road construction. Much of this habitat has been eliminated and/or fragmented by timber harvest, mining, roading agriculture and urban development. Non-native plants are being found increasingly in disturbed riparian areas, especially along roads. According to information in the Coeur d'Alene River Ranger District Noxious Weed Control Project Draft EIS, non-native species can impact the native flora and reduce native biodiversity, especially in diverse habitats like riparian zones and other sensitive plant communities (IPNF 1998).

The analysis areas involve lands close to human habitation, so past disturbances here are greater than some interior portions of the Coeur d'Alene basin. The database shows that, in the project area, about 11 percent of National Forest System Lands have been regeneration harvested. Records show that 23 percent of the total National Forest System acres have had some other form of timber harvest (overstory removal, salvage, commercial thin, selection), though some of these acres represent multiple harvests. Existing riparian-encroaching roads (see Soils and Aquatic Resources) have had and continue to have significant effects on hydrology and riparian plant communities in the project area. While precise data are not available on the amount of sensitive plant habitat and populations that have been impacted or lost due to past disturbances, it can be surmised that changes have occurred.

ENVIRONMENTAL CONSEQUENCES

Methodology

Analysis was conducted using results of past sensitive plant surveys, current distribution and condition of sensitive plant species in habitats similar to those found in the proposed treatment sites, types of proposed treatments and the likely effects to existing populations and habitat from the proposed activity based on current knowledge and professional judgement. It included a broad-scale assessment of the distribution and suitability of sensitive plant habitat in relation to proposed activities and a detailed analysis of each proposed activity and the need for mitigation, including field surveys.

The cumulative effects analysis area for TES plants was the Coeur d'Alene subbasin.

Effects to sensitive plant species or suitable habitat from proposed activities are generally described as very low, low, moderate or high, with the following definitions:

> ***very low*** *= no measurable effect on individuals, populations or habitat*
>
> ***low*** *= individuals, populations and/or habitat not likely affected*
>
> ***moderate*** *= individuals and/or habitat may be affected, but populations would not be affected, and habitat capability would not over the long term be reduced below a level which could support sensitive plant species*
>
> ***high*** *= populations may be affected and/or habitat capability may over the long term be reduced below a level which could support sensitive plant species*

Effects to population viability from disturbance events (natural or man-caused) are difficult to quantify with certainty for all sensitive plant species and species of concern. Specific knowledge of population ecology is lacking for several species addressed in this analysis, particularly the sensitive moonworts and certain orchid species: round-leaved rein orchid and phantom orchid. Much of the current knowledge regarding sensitive plant species is based on observational (non-empirical) and even anecdotal information. Recent literature and monitoring reports on several species, including: deerfern (Blake and Ebrahimi 1992), clustered ladies slipper (Greenlee 1997), Henderson's sedge and Constance's bittercress (Lichthardt 1998) and Idaho strawberry (Crawford 1980), provide a greater understanding of the relationship of habitat disturbance to the integrity of populations of these species.

For unsurveyed habitat that is highly suitable to support sensitive plants, presence is assumed. Protection of large occurrences and contiguous, unoccupied highly suitable habitat is assumed to be an effective conservation strategy. As described in Features Common to All Action Alternatives (Chapter II), populations would be protected; some isolated individuals may be impacted by activities. For occurrences that are likely to be discovered during field surveys prior to project implementation, mitigation measures would be designed by the project botanist to ensure populations are protected.

While a high number of acres have been identified as containing highly suitable habitat, based on past sensitive plant surveys, only a very small percentage of suitable habitat is likely actually occupied. Even with the presence of abundant suitable habitat, because the plant species addressed in this analysis are rare, most suitable habitat is unoccupied.

Indicators used to measure effects on sensitive plants and suitable habitat include: predicted canopy reduction due to the effects of Douglas-fir beetles and harvest treatments, the amount of each proposed activity, the extent of ground disturbance, proximity of known sensitive plant occurrences and suitable habitat to proposed activities, and the predicted reduction of heavy fuel loads.

The following table provides a risk assessment, based on the best available information, to sensitive plants and Forest species of concern in the analysis areas from certain types of disturbance. The risk for certain management activities refers to potential effects in the absence of mitigation.

Table III-27. Summary of risk to sensitive plants and Forest species of concern from proposed activities in highly suitable habitat, by plant guild.

Proposed Activity or Event	Rare Plant Guild potentially affected	Risk of Adverse Impacts to Sensitive Plant Occurrences (without mitigation)
Loss of < 50% canopy due to insects or disease	Wet Forest/ Moist Forest / Dry Forest	Low to Moderate
Loss of > 50% canopy due to insects or disease	Wet Forest/ Moist Forest / Dry Forest Guild	Moderate to High
Regeneration harvest, including site preparation	Moist Forest / Dry Forest Guild	High
Commercial thinning and selective harvest using ground based equipment	Moist Forest / Dry Forest Guild	High
Helicopter and Roadside Selection harvest	Moist Forest/ Dry Forest	Low
Full Road Obliteration	Wet Forest/ Moist Forest / Dry Forest Guild	High
New road construction	Wet Forest / Moist Forest / Dry Forest/Peatland	High
Road reconstruction/reconditioning	Wet Forest / Moist Forest / Dry Forest	Low
Channel crossing removal (culverts)	Wet Forest / Moist Forest	Low to Moderate
Road closure, ripping, seeding	All	Low
In-stream fisheries/watershed restoration (structure placement w/equipment)	Deciduous Riparian/Wet Forest/Peatland	High
Fuel reduction by underburning	Wet Forest/ Moist Forest / Dry Forest	Moderate to High
Fuels reduction - mechanical	Moist Forest / Dry Forest	Moderate to High
Fuel break construction	Wet Forest / Moist Forest / Dry Forest	Moderate to High
Noxious weed prevention and treatment	Dry Forest / Moist Forest	Low to Moderate
Stand replacing wildfire	Wet Forest / Moist Forest / Dry Forest	Moderate to High

** Some Dry Forest sensitive plant species may be dependent on periodic low levels of disturbance from fire, such as that which occurred historically in some dry forest habitats. The timing of an underburn relative to soil moisture in suitable habitat and the flowering and fruiting of the plant species of concern also influences potential effects.*

Without mitigation, there exists a high likelihood of adverse effects to sensitive plants in highly suitable habitat, especially from moderate to high risk activities such as regeneration harvest, commercial thinning using tractor or skyline methods, road construction, fuel break construction, full road obliteration (return to contour), and fuels reduction (underburning and mechanical treatment). These effects could lead to loss of population viability, or trend toward Federal listing, especially for plant species in the **moist, dry and wet guilds.**

For certain species, moderate to low risk activities such as selective harvest, low intensity fire, and road reconstruction, are not likely to adversely affect population viability, even though individual plants may be affected. Observations and monitoring information indicate that some activities may have little effect or even a positive effect on species tolerant of low to moderate levels of disturbance, such as deerfern (Blake and Ebrahimi 1992), Idaho strawberry and Constance's bittercress (Crawford 1980).

Direct, Indirect and Cumulative Effects at the Analysis Area Scale

For sensitive plants direct, indirect and cumulative effects were not addressed at the analysis area level. All effects were addressed at the project area level.

Direct, Indirect and Cumulative Effects at the Coeur d'Alene Project Area Scale

Effects Common To All Action Alternatives

Direct and Indirect Effects

No harvest or project-related activities are proposed within deciduous riparian, subalpine, peatland or aquatic habitats in the analysis areas. Based on the location of proposed activities and professional judgement, no deciduous riparian, peatland, subalpine or aquatic habitat able to support any sensitive plant species would be impacted by implementation of any of the action alternatives; there would be no direct or indirect impacts to any sensitive species occurring in these guilds.

Based on the presence of suitable habitat in proposed activity areas, the determination of effects for the following moist, dry and wet forest species is "May Impact Individuals Or Habitat, But Will Not Likely Contribute To A Trend Toward Federal Listing Or Cause A Loss Of Viability To The Population Or Species". The *sensitive* species affected include: maidenhair spleenwort, green bug-on-a-stick moss, deerfern, upswept moonwort, dainty moonwort, triangle moonwort, Mingan moonwort, western goblin, peculiar moonwort, stalked moonwort, northwestern moonwort, least moonwort, Constance's bittercress, Henderson's sedge, clustered lady's slipper, clear moss, chickweed monkeyflower, Sierra woodfern, and Idaho barren strawberry.

Henderson's sedge has documented occurrences and highly suitable habitat in stands affected by the Douglas-fir beetle and in close proximity to proposed project activities. Recent studies indicate that Henderson's sedge can recover over time from significant canopy removal (regeneration harvest) and burning, however the reproductive capacity of plants may be reduced for an unknown period (Lichthardt 1998). The Features for Threatened, Endangered and Sensitive plants (Chapter II) would ensure that Henderson's sedge populations are protected.

The Forest species of concern bank monkeyflower and phantom orchid also occur in the project area. Bank monkeyflower is a species which is adapted to disturbed mineral soils (Lorain 1993). Harvest activities proposed to take place in documented occurrences may impact individuals, but would not adversely effect populations of this species. Phantom orchid has documented occurrences in the vicinity of proposed units. This species is intolerant of ground disturbance, and one proposed unit was dropped to avoid impacts to this species.

Proposed units and project-related activities were dropped or otherwise modified as necessary during the alternative design process in order to ensure protection of populations of these species. Sensitive Plant Features (Chapter II) would provide for protection of populations that may be detected during field surveys conducted prior to project implementation.

Project-Related Activities

Direct and Indirect Effects

Silvicultural

Direct impacts of timber harvest can include elimination of individual plants through ground disturbance. Indirect impacts to sensitive plants can include changes in fuel loading, duff levels, moisture regime, and light levels. Effects to sensitive plants would vary according to species and harvest prescription. Most timber harvest would take place in dry and moist habitats, so most of the effects would be confined to dry and moist forest guild species. Fewer than 50 acres of wet forest guild habitat would be impacted by harvest in any alternative. Since Riparian Habitat Conservation Area guidelines would be followed for all action alternatives, most wet forest habitat would be excluded from harvest activities. Road construction and fuel break construction and road obliteration and other watershed restoration activities could potentially impact wet forest habitat. About 70% of the total suitable sensitive plant habitat potentially affected by harvest is in moist forest guild habitats, and 25% to 30% is in dry forest guild habitats.

Table III-28. Summary acres of suitable sensitive plant habitat potentially affected by harvest treatment, by alternative*.

Rare Plant Guild	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Moist Guild	0	2,273	2,273	2,660	2,273	1,794	0
Dry Guild	0	949	949	1,131	949	669	0
Wet Guild	0	47	47	47	47	36	0
Total Guild	**0**	**3,269**	**3,269**	**3,838**	**3,269**	**2,499**	**0**

**Acreage figures were derived from Timber Stand Management Records System data.*

Selective Harvest and Commercial Thinning: The discussion that follows applies to selective harvest exclusive of fuels treatment. Selective timber harvest is proposed in all action alternatives. Regeneration treatment is proposed in all alternatives except Alternatives E and G, and thinning would be done only in Alternative D. In Alternatives B, C, D, E and F it is the predominant treatment, making up approximately 80% to 100% of all harvest prescriptions where proposed. Selective harvest would remove trees killed by the Douglas-fir beetle, with incidental removal of live trees in skid trails and corridors; canopy coverage would be reduced by up to about 30%. Since large (greater than 14-inch) diameter Douglas-fir are unequally distributed across the landscape, mortality could occur in a scattered to patchy configuration, with resultant openings in selection units of up to about 2-3 acres in size. The actual effects of selective harvest would be similar to the effects of mortality on Douglas-fir caused by the beetle as in Alternative A, No Action. The main difference would be the change in fuel loadings in untreated stands and resulting increased risk to sensitive plants from future stand-replacing wildfires. There would be some direct effects from selective harvest in suitable habitats for sensitive plants of the moist, dry, and wet guilds, especially those that are intolerant of changes in the moisture and light regime (i.e. mycotrophic species, moonworts and orchids). The other species are not likely to be adversely affected by selective harvest treatment. Commercial thinning of larch and ponderosa pine would take place only in Alternative D. Commercial thinning is predicted (see Vegetation) to remove about 30% of the canopy cover, the same as in selective harvest. Commercial thinning would, however, result in a more uniform spacing of trees than with salvaging, but small openings could still result due to the activity of the beetles. Effects of commercial thinning to sensitive plants would generally be the same as selective harvest.

Regeneration Harvest: Regeneration harvest would make up about 10% of the harvested acreage where this treatment occurs in alternatives. Regeneration harvest would be done in stands where greater than 50% of the basal area of the stand is predicted to be lost due to beetle mortality. Approximately 80% of the overstory canopy would be removed with regeneration treatment. Live green trees in addition to beetle afflicted Douglas-fir would be cut in order to provide conditions suitable for reforestation with disease resistant tree species. Fuels treatment would occur in most regeneration units, consisting of either underburning or top attached yarding, while hand-piling is designated in a few units. Regeneration harvest would directly affect Moist, Dry, and only slightly Wet Guild sensitive plant habitat. The limited data and observations available indicate that most species in these Guilds are intolerant of major canopy removal. Bank monkeyflower, while not likely to be affected by an increase in sunlight due to canopy removal, could be impacted by excessive ground disturbance. Mycotrophic species such as moonworts and sensitive orchids are very vulnerable to regeneration harvest. The most detrimental sort of regeneration harvest treatment appears to be with ground based equipment, followed by a hot burn which consumes a lot of the organic matter on the site, or with mechanical fuels treatment. The least detrimental would be that in which top attached yarding was used as the fuels treatment, though the potential for impacts due to alteration of the moisture regime would still be high. The action alternatives display various fuels treatment and harvest combinations.

Harvest System

The yarding methods employed for Alternatives B, C, D, E and F would be approximately 2/3 helicopter, 1/3 skyline, and a small amount of tractor yarding. Helicopter yarding would have an insignificant effect on sensitive plants and habitat because there would be little or no ground disturbance. Some damage to the live crowns of leave trees would be expected, but it would be minimal. Skyline would be intermediate in effect between helicopter and tractor yarding. Skyline would necessitate construction of corridors for yarding purposes in which long narrow canopy openings would be created. Some ground disturbance would result from the yarding process. Tractor yarding would cause the most detrimental and long lasting impacts to the sensitive habitat, but mainly on designated skid trails. Here, compaction and soil displacement would be the primary negative effects. In all alternatives, Forest Plan Standards and Guidelines would be met for woody debris retention on site and minimizing soil displacement and compaction.

New Road Construction, Road Reconstruction, and Reconditioning

New road construction, road reconstruction, and reconditioning would take place in all action alternatives except Alternatives C and G, which would construct no new roads. These activities vary in the potential for effects to moist, wet, and dry forest guild habitats and species. New road construction is a high ground disturbance activity, constituting a high risk to sensitive species in these guilds. Proposed new road construction varies from 0 to 20 miles in any action alternative. Prior to new road construction, previously unsurveyed, highly suitable habitat in the activity area would be surveyed, any newly found occurrences deemed critical to species/population viability would be protected. Road reconstruction and reconditioning are low risk activities in terms of direct or indirect effects to sensitive plants and habitat. For these activities, existing road prisms would be treated which are already disturbed and of very low habitat suitability. While there are a few sensitive plant occurrences on the IPNF on old roads or cutbanks, they are usually individuals isolated from the main occurrence.

Fuels Treatment

Various methods of fuels reduction are proposed under action alternatives, all having the potential to directly and indirectly impact sensitive plants. Slashing, yarding tops and lop and scatter fuels treatments would have a negligible effect on sensitive plant species. Underburning for fuels reduction would be done within harvest unit boundaries, except in Alternative F where underburning would be done outside harvest units, as well. Spring burning has the potential to impact sensitive plant individuals, particularly clustered lady's slipper and moonwort species. Project design would minimize the risk of effects to documented occurrences of species vulnerable to burning. Features for TES Plants (Chapter II) would protect populations and highly suitable

habitat that may be discovered during field surveys prior to project implementation. There would be a risk of increasing certain noxious weed species with burning, depending on the proximity to existing infestations and the cover type of the area treated (refer to Chapter III, Noxious Weeds). Regeneration units would generally have fireline constructed to contain the fire. For some treatment units in Alternative F, underburning would take place both within and outside of harvest unit boundaries. Fire outside the units would be of low intensity (see Fire and Fuels, Chapter III). There would be no underburning within designated Riparian Habitat Conservation Areas, effectively buffering riparian wet forest habitats from this type of activity. Impacts to moist forest habitat would be very low.

Fireline and various types of fuelbreak construction, occurring mainly in Alternatives F and G, and to some extent in Alternative D, have the potential to impact sensitive plants and habitat through vegetation and ground disturbance. Sensitive plant features for all action alternatives (Chapter II) would protect documented populations and mitigate for new ones discovered prior to implementation.

Watershed Rehabilitation, Including Road Obliteration and Removal/Replacement of Road Channel Crossings

Watershed rehabilitation activities have the potential to directly and indirectly impact moist, wet and dry forest guild habitats. Though these treatments often focus on wet forest habitats, a relatively small amount of previously undisturbed habitat is usually affected with these activities. The long term effects of the treatments would be beneficial to sensitive plants because channel stability and riparian community habitat would be improved.

Wildlife/Ecosystem Burning

Burning for wildlife habitat and ecosystem enhancement is a feature of Alternative F and G, and an opportunity in Alternative D. This activity has the potential to affect primarily dry forest guild species, and to a lesser extent, moist forest guilds. The effects would be similar to those of underburning for fuels reduction.

Weed Treatment and Prevention

Noxious weed treatment and prevention would be performed consistent with provisions in Chapter II, Noxious Weed Features and Appendix C, Noxious Weeds. Weed treatment and prevention measures would reduce, but not eliminate the risk of weed spread in the project area. Mowing along identified, infested haul roads would reduce seed production, thus minimizing the risk of weed spread in treated areas. Mowing is considered a low-risk activity for sensitive plants. Mowing would affect vegetation for approximately eight feet on either side of the roadway. Although there is a slight chance of impacting individual deerfern or moonwort plants with this activity, large occurrences/populations would be unlikely to be impacted. Individuals of these species occasionally colonize disturbed roadsides and cutbanks; however, these locations constitute marginal habitat, and are usually isolated from the main occurrence or population.

Tree Planting

Tree planting would result in a minor amount of soil disturbance with hand tools. The risk of incidental effects to sensitive plants from this activity are predicted to be very low.

Cumulative Effects

No cumulative impacts to sensitive species or suitable habitat in aquatic, deciduous riparian, peatland, or subalpine forest guilds are expected from implementation of any of the action alternatives, since they would be buffered from all activities as disclosed in Features Common to All Action Alternatives (Chapter II).

Past activities on Federal lands prior to policies affording protection of rare plants, have affected populations and habitat of sensitive plant species. Current activities proposed on Federal lands are required by law and

policy to address sensitive plant species. Populations, when found, are managed for. Activities on State and private lands are not required to protect these species, therefore, loss of populations and modification of habitat is likely occurring. A low to moderate level of cumulative effects from activities on lands under other ownership is likely for some sensitive plant species.

Henderson's sedge (*Carex hendersonii*) has the greatest number of occurrences of any known sensitive plant in the project area. Individuals peripheral to populations and highly suitable habitat are present within areas proposed for activities. Design criteria, as in Threatened, Endangered, and Sensitive Plants Features (Chapter II), would be applied to protect Henderson's sedge populations. Cumulative effects to Henderson's sedge are predicted to be low in any action alternative.

Cumulative impacts resulting from recent Douglas-fir beetle activity in moist forest habitat could include high-intensity, duff-replacing wildfires from predicted high fuel loading in untreated areas. Such a fire, if it were to occur, would be detrimental to obligate mycorrhizal species such as the moonworts, phantom orchid, clustered lady's slipper, and round-leaved rein orchid. Populations of these species could be destroyed if such a fire were intense enough to remove a significant amount of duff and organic material. The prospect of recolonization of affected habitat by any of these species would depend on the extent and duration of habitat alteration and the availability of an adjacent seed source. Cumulative impacts to these species related to stand-replacing wildfire would be predicted to be low to moderate.

Foreseeable Actions

A list of reasonably foreseeable and ongoing projects on the Coeur d'Alene River Ranger District is included in Appendix E. Projects include timber harvest on Federal lands, repairs and resurfacing on National Forest roads, wildlife burns, noxious weed treatment, recreation and road access, grazing allotments and slash disposal.

Implementation of projects on National Forest lands would contribute insignificant impacts to sensitive plants or suitable habitat, since Federal lands are managed to maintain sensitive plant populations. Sensitive plant and habitat assessment are conducted for all ground and/or vegetation disturbing on in the District. While individuals of some sensitive plants may occasionally be impacted, cumulative impacts to species and habitats would be expected to be low.

State and private landowners are not required to maintain sensitive plant populations; impacts to some sensitive species and habitat have likely occurred and may continue, contributing at least low to moderate levels of cumulative impacts.

Alternative A (No Action)

Direct and Indirect Effects

The Douglas-fir beetle infestation, and associated tree mortality has been predicted to spread, to approximately 25,000 acres in the project area, with mortality continuing for approximately two more years. While it is difficult to accurately predict the total distribution and extent of the infestation, this projection indicates the potential for bark beetle effects in the absence of management activities. The effects would be variable across the landscape, depending on environmental factors and stand conditions. These effects would be most significant in stands with a high proportion of Douglas-fir greater than 14 inches in diameter. More open stands, and stands having low proportions of Douglas-fir trees less than 14 inches in diameter, would, in general, have less mortality. The effects of the bark beetle will be most pronounced in dry to moist habitats, which may be suitable for dry and moist guild sensitive plants species.

Direct and indirect effects from the beetle infestation on sensitive plant populations are likely for certain species, if those species are present within affected stands. In stands where a high percentage of the canopy

(greater than 50% loss of the basal area) will be lost due to mortality from the beetle infestation, the likely effects to certain sensitive plant species present could range from a beneficial response, due to factors like increased levels of light and available moisture, a neutral response, species persist but there is no evident change in population levels, to an intolerant response because of factors like loss of shade and decrease in relative humidity. Indirectly, there would be a increased risk to sensitive plants and habitat due to the increase in fuel loads through time. The increase in ignition risk and a resulting fire would also have an array of likely effects for sensitive plant species, ranging from beneficial to intolerant, depending on factors like the intensity of the fire, the species ability to survive the event, and compete in early successional habitat. The ability to analyze these direct effects for all sensitive plant species is limited given our current level of knowledge.

Certain species have populations in earlier seral habitats established by fire within the last 50 years, or in habitats that likely had frequent historical fires. It appears that these species are at least tolerant of more open forest conditions, and natural disturbance events such as fire. One such species is Constance's bittercress, a moist to wet forest guild plant. This species has been observed to survive and multiply, at least vegetatively, after wildfire on the St. Joe Ranger District (Mousseaux 1998). Indications are that survival of Constance's bittercress after fire may be dependent on the availability of moist microsites. Lichthardt (1998) noted from monitoring data, that this species had the highest stem densities in the earliest seral stages of forest communities. Low stem densities and population vigor were observed in advanced seral stages of stand development.

Bank monkey-flower, a dry forest guild species, is present in dry, open forest habitats in the project area. It favors steeply sloping (greater than 60%), southeast to southwest aspects with a thin soil layer. These habitats historically have had a higher frequency of non-stand replacing fires, than the moist and wet habitats. This annual plant's reliance on a soil seed bank for reproduction may contribute to its ability to survive low intensity fire.

All the other moist forest, dry forest, and wet forest guild species have populations in mid- and later successional habitats, preferring more closed canopy conditions. Some of these species such as moonworts (*Botrychium* species), round-leaved rein orchid, phantom orchid, and clustered ladies' slipper, have factors like obligate soil mycorrhizae relationships that are likely to be affected by canopy reduction of greater than 50%, and moderate to intense (duff-replacing) fires. Stand-replacing fires were an important part of ecosystem processes in northern Idaho and the Coeur d'Alene Basin prior to the beginning of suppression efforts in the 1930s. While not much is known about the historic condition of rare plant communities, it is evident that with the decrease in the quality and amount of highly suitable habitats, and increase in fragmentation due to human activities, the ability of most rare plants to recolonize following disturbance has been reduced.

Cumulative Effects of Alternative A

Cumulative effects under Alternative A include those resulting from beetle activity alone as well as foreseeable actions discussed above under Effects Common to All Action Alternatives.

Wet Forest Guild

Cumulative impacts to wet forest habitat would be predicted to be low overall, given the small amount of such habitat that has been affected by recent bark beetle activity.

Moist Forest Guild

Cumulative impacts to highly suitable moist forest habitat related to loss of canopy cover are predicted to be moderate where stands have been sufficiently opened to promote establishment of early seral understory vegetation. The likeliest cumulative impacts would be to those species with a broader habitat range

(**moonworts, round-leaved rein orchid, phantom orchid** and **clustered lady's slipper**) which seem to require dense shade and/or soil mycorrhizae and which may not compete successfully with early seral forbs. Cumulative impacts to moist forest habitat where canopy cover has not been significantly reduced would be low.

Cumulative impacts resulting from recent Douglas-fir beetle activity in moist forest habitat could include high-intensity, duff-replacing wildfires from predicted high fuel loading in untreated areas. Such a fire, if it were to occur, would be detrimental to obligate mycorrhizal species such as the moonworts, phantom orchid, clustered lady's slipper, and round-leaved rein orchid. Populations of these species could be destroyed if such a fire were intense enough to remove a significant amount of duff and organic material. The prospect of recolonization of affected habitat by any of these species would depend on the extent and duration of habitat alteration and the availability of an adjacent seed source. Cumulative impacts to these species related to stand-replacing wildfire would be predicted to be low to moderate.

Long-term impacts to deerfern could occur in the event of a stand-replacing wildfire as a result of heavy fuel loads. Deerfern is apparently able to survive light surface fires, and may recolonize by sprouting from rhizomes or by spores from adjacent populations. Its response to severe wildfire is not known. Fire intervals in its cool, wet forest preferred habitat are estimated to be several hundred years, so that large-scale fires are usually catastrophic. Cumulative impacts on deerfern from a potential future wildfire would be difficult to predict.

Dry Forest Guild

Cumulative effects to dry forest guild species and habitat with Alternative A are expected to be low to moderate. The effects to dry habitats, especially those with a high proportion of Douglas-fir, would be slightly greater than in the wet and moist guilds because of the greater extent of beetle infestation in these habitats. Canopy reduction could be greater in some stands and the associated risk of stand replacing fire in beetle affected dry habitats would increase with increased fuel loads. Since dry forest species are adapted to habitats which, historically, experienced a greater fire frequency, some would likely survive a stand replacing fire in scattered microsites. Successful recolonization for species after such disturbance events would be more difficult than it was historically due to fragmentation and overall habitat reduction.

Table III-29. Total acres of suitable sensitive plant habitat currently affected or at high risk of future infestation by Douglas-fir beetles, Alternative A (No Action).

Rare Plant Guild	Acres of Suitable Habitat Potentially Affected by Douglas-fir Beetles
Moist Guild	5,309
Dry Guild	2,929
Wet guild	93
Total Acres	**8,381**

Alternative B (Proposed Action)

Direct and Indirect Effects

Alternative B would harvest comparable acres of suitable sensitive plant habitat to Alternatives C and E. Regeneration harvest, considered a high risk treatment in regard to sensitive plants, would make up a relatively small portion of the total harvest acres (about 10%). Helicopter selection harvest, with associated top attached yarding, would be a major component of this alternative. This treatment combination would have minimal direct and indirect effects on most moist, wet, and dry forest sensitive species. Approximately 900 acres of underburning is proposed. There would be a risk of indirect negative effects to some documented sensitive plant populations from escaped prescribed fire, but this risk would be low. Effects to sensitive plants from new road construction would be low with implementation of Features Common to all Action Alternatives (Chapter II).

Cumulative Effects of Alternative B

In general, cumulative effects from proposed activities would be low considering the level of dead tree selective harvest using helicopter yarding. Cumulative effects on areas treated with selective harvest would be only slightly higher than the effects on these acres from the action of Douglas-fir beetles, as in Alternative A. Areas treated with regeneration harvest and selective harvest, utilizing ground based yarding systems and fuels treatments would have low to moderate cumulative effects.

Given the requirements for surveys and features for the protection of sensitive plant populations and habitat, overall cumulative impacts to sensitive species from proposed activities with this alternative would be low. A substantial reduction of fuel loads in treated areas would reduce cumulative impacts.

Alternative C

Direct and Indirect Effects

Alternative C would harvest comparable acres of suitable sensitive plant habitat to Alternatives B and E. Regeneration harvest, considered a high risk treatment in regard to sensitive plants, would make up a relatively small portion of the total harvest acres. Helicopter selective harvest, with associated tops attached yarding, would be a major component of this alternative. This treatment combination would have a minimal effect on most moist, wet, and dry forest sensitive species. As in Alternative B, potential for indirect effects from underburning on 900 acres (related to escaped prescribed fire) would be low. A distinguishing feature of this alternative is the lack of proposed new road construction; however, this alternative would reduce the potentially affected acres of suitable sensitive plant habitat by a minimal amount.

Cumulative Effects of Alternative C

The cumulative effects to sensitive plants with this alternative would be very similar to those of Alternative B.

Alternative D

Direct and Indirect Effects

Alternative D would harvest the most acres of suitable sensitive plant habitat of any alternative; therefore, it would have the greatest potential for direct and indirect effects to sensitive plants and suitable habitat. Regeneration harvest, considered a high risk treatment in regard to sensitive plants, would make up a small portion of the total harvest acres, as in Alternatives B, C and F. Helicopter selective harvest, with associated lop and scatter fuel treatment, would be a major component of this alternative. This treatment combination would have a minimal effect on most moist, wet, and dry forest sensitive species. The increase in harvest acres is

comprised primarily of commercial thinning treatments in larch and ponderosa pine. Though commercial thinning would remove green trees, direct and indirect effects to sensitive plants and habitat would be similar to those of selective harvest, due to the degree of canopy reduction. Approximately 1,829 acres of underburning is proposed in treated areas, constituting a risk of indirect negative effects related to escaped prescribed fire, second only to Alternative F. Road building and associated effects would be the highest of the action alternatives, but would still be considered low with implementation of Features Common to All Action Alternatives (Chapter II).

Cumulative Effects of Alternative D

The cumulative effects of this alternative would be slightly greater than the other action alternatives. Harvest treatments and new road construction exceed all other action alternatives. Underburning approximately 900 acres of suitable sensitive plant habitat may directly affect individual sensitive plants, but would reduce fuel loadings and potential cumulative effects. Mitigation measures for TES plants (Chapter II) would protect documented occurrences and populations that may be discovered during field surveys. Overall, the cumulative effects of this alternative are expected to be low.

Alternative E

Direct and Indirect Effects

Alternative E would harvest similar acreage to Alternatives B and C; however harvest treatments would consist of dead tree removal only. Units designated as regeneration harvest account for about three percent of the total harvest acreage. Regeneration units would have fuels treated with either lop and scatter or underburning. Ground-based fuels treatments would be minimal, the majority of acres being treated by lop and scatter. Helicopter selective harvest would be a major component of this alternative (about 63 percent by volume). This treatment combination would have a minimal effect on most moist, wet and dry forest sensitive species. The amount of underburning would be low (about 373 acres). The direct and indirect effects of new road construction would be similar to Alternative B.

Cumulative Effects of Alternative E

Cumulative effects for this alternative would be slightly greater than those of Alternative A, but lower than Alternatives B, C and D, since all treatments are selective (dead tree only) and few units would need planting. The level of canopy reduction would be similar to the predicted effects of the bark beetles alone in affected stands. The level of selective harvest with helicopter yarding would minimize cumulative effects.

Alternative F

Direct and Indirect Effects

Alternative F would harvest slightly fewer acres of suitable sensitive plant habitat than Alternatives B, C and E, so direct and indirect effects due to harvest would be the lowest of alternatives featuring this activity. Regeneration harvest, considered a high risk treatment in regard to sensitive plants, would make up a small portion of the total harvest acres (about 10 percent). Helicopter selective harvest would be a major component of this alternative (about 62 percent by volume). The distinguishing feature of Alternative F is the approximately 5,406 acres of underburning proposed in treated areas. With this alternative, there is a risk that prescribed fire in treated units could escape into otherwise buffered Riparian Habitat Conservation Areas. While fire intensity in these areas is predicted to be low, escaped fire would constitute a potential threat to documented sensitive plant occurrences and high potential moist and wet forest habitats. Extensive construction of various types of fuel breaks would be undertaken in Alternative F. While documented and newly identified sensitive plant occurrences would be protected (Features Common to All Action Alternatives, Chapter II), there would be direct and indirect long-term impacts to sensitive plant habitat. Miles of fuelbreaks

would be constructed and maintained over time, opening up the forest canopy, increasing off-road vehicle traffic and the associated risk of weed infestation in these areas. While there would be direct impacts to habitat, indirectly, such activities as underburning and fuel break construction could lower the long-term risk to sensitive plants and habitat from stand-replacing wildfires. The direct and indirect effects of new road construction would be similar to Alternative B.

Cumulative Effects of Alternative F

The cumulative impacts of this alternative would be slightly lower than Alternatives B, C and E, in impacts due to timber harvest. Though there would be potential direct and indirect effects due to proposed fuels treatment activities, the long-term cumulative effects of these actions would be beneficial in reducing the risk of stand replacing fire. Overall, cumulative effects to sensitive plants and habitat with Alternative F are predicted to be low.

Alternative G

Direct and Indirect Effects

No timber harvest is proposed under Alternative G, so there would be no direct or indirect effects from harvest systems.

Slashing and underburning are proposed under Alternative G on approximately 1,115 acres to reduce bark beetle-generated fuels and to promote favorable conditions for wildlife. The effects of underburning on suitable sensitive plant habitat would vary by species, habitat guild and the intensity of the burn. Low-intensity ground fire would not be detrimental to sensitive plant species or suitable habitat of species exhibiting a positive response to burning, such as Constance's bittercress, which is adapted to early seral habitats. Burning would potentially affect individuals of the moist forest guild which depend on fungal associations in the soil (mycorrhizae), such as clustered lady's slipper and moonwort species. Areas where fuel concentrations induce a hotter burn would be at highest risk of negative effects to suitable sensitive plant habitat or undetected individuals. There is a risk of adverse effects to moist, dry and wet forest guilds in the event of an escaped fire, but provisions in underburning prescriptions would reduce this risk. Since the objective of underburning is to reduce small diameter fuels while maintaining a cool burn, these risks are expected to be low.

Cumulative Effects of Alternative G

The cumulative effects of this alternative would be the lowest of the action alternatives and similar to No Action, Alternative A.

Effects of Opportunities

It should be noted that accomplishment of additional watershed/wildlife restoration projects, weed treatment and prevention other than those under contract clauses and timber stand improvement work would be subject to availability of KV or other appropriated funding. The direct and indirect effects would be the same for these potential activities as discussed above.

Timber stand improvement work

Timber stand improvement projects would occur in stands with overall low potential to support sensitive plant species. Individual sensitive moonworts could be impacted, with a low level of cumulative impacts expected.

Wildlife/Ecosystem Burning

This activity is addressed under Project-Related Activities above.

Weed Treatment

Weed control is a reasonably foreseeable future action listed in Appendix E of the Final EIS. Additional weed treatments in the Douglas-fir beetle project area will be considered pending completion of the Final EIS and a Decision for that project. Guidelines for weed treatment would be similar to those included in the Final EIS, Noxious Weeds Management Projects, Priest Lake Ranger District (IPNF 1998).

There is an increased risk of weed spread with all action alternatives, particularly in regard to certain species such as goatweed, in susceptible habitats. The risk would be greatest in habitats where more than 50% canopy loss due to beetle induced mortality occurs. Weeds increase in beetle-affected stands may indirectly impact sensitive plants and highly suitable habitat where present in affected areas.

Determination of Effects

Based on the above analysis, and with the provisions for surveys and protection of sensitive plant populations (Features Common to All Action Alternatives, Chapter II), the following table represents the determination of effects to sensitive plants for each alternative. The Biological Evaluation from which the table was derived is in the project file. A description of habitat guilds and list of sensitive species is included in Appendix B.

Table III-30. Summary of determination of effects on sensitive plant species, by guild, for each alternative.

Species Guild	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Moist Forest Guild	MIIH	MIIH	MIIH	MIIH	MIIH	MIIH	MIIH
Dry Forest Guild	MIIH	MIIH	MIIH	MIIH	MIIH	MIIH	MIIH
Wet Forest Guild	MIIH	MIIH	MIIH	MIIH	MIIH	MIIH	MIIH
Subalpine Guild	NI	NI	NI	NI	NI	NI	NI
Peatland Guild	NI	NI	NI	NI	NI	NI	NI
Deciduous Riparian Guild	NI	NI	NI	NI	NI	NI	NI

NI = No Impact
MIIH = May Impact Individuals or Habitat with no trend to federal listing or loss of species or population viability
WIIH = Will Impact Individuals or Habitat with a likely trend to federal listing and/or loss of population or species viability
BI = Beneficial Impact

Sensitive Plant Surveys

The following measures are required to validate the Determination of Effects for sensitive plants in this EIS:

As described in Chapter II, all previously unsurveyed areas identified as potential or highly suitable habitat that, as a result of the proposed activity, would have a high risk of adverse effects to sensitive plants or habitat and a likely reduction in population viability, must be surveyed prior to project implementation. Some areas previously surveyed may be resurveyed, based on the date and intensity of the most recent sensitive plant survey and the risk to sensitive habitat from proposed activities.

In addition, approximately 7,000 acres in the analysis areas proposed for treatment (Alternative D) must be field assessed for habitat suitability, and identified suitable habitat surveyed, prior to project implementation. The table below displays the number of acres within proposed activity areas, including harvest units, wildlife/ecosystem burning, road construction, and road obliteration, which must be surveyed prior to project

implementation. Survey acres were based on habitat queries (refer to the project file), aerial photograph and topographical map interpretation, previous sensitive plant surveys, risk of adverse impacts to sensitive plants and suitable habitat from the proposed activity, and professional judgement. Lists of specific units which must be surveyed are contained in the project file. It should be noted that, in some cases, potential habitat occurs only in portions of units, and the entire unit would not be surveyed. Other highly suitable habitat adjacent to proposed units may be surveyed based on the potential risk of adverse effects from proposed activities.

Table III-31. Amount of suitable habitat to be surveyed, Coeur d'Alene project area.

Habitat Guild	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Wet Forest Guild	0 0	0 0	0 1.4 mi.*	0 0	61 ac. 0	0 3.44 mi.*
Moist Forest Guild	2,259 ac. 99.15 mi.*	1,857 ac. 97.50 mi.*	3,870 ac. 131.77 mi.*	1,683 ac. 99.15 mi.*	3,552 ac. 73.40 mi.*	97 ac. 278.32 mi.*
Dry Forest Guild	808 ac. 2.78 mi.*	849 ac. 82.1 mi.*	2,725 ac. 85.10 mi.*	551 ac. 82.78 mi.*	2,713 ac. 22.60 mi.*	252 ac. 97.54 mi.*
Deciduous Riparian Guild	0	0	0	0	0	0
Peatland Guild	0	0	0	0	0	0
Subalpine Guild	0	0	0	0	0	0
Total by Alternative	3,067 ac. 101.93 mi.*	2,706 ac. 179.60 mi.*	6,595 ac. 218.27 mi.*	2,234 ac. 181.93 mi.*	6,265 ac. 96.0 mi.*	350 ac. 212.90 mi.*

* *Miles of road to be surveyed represent entire road segments within suitable habitat. Other than road segments proposed for new construction or obliteration, surveys would be conducted only on portions which are proposed for watershed restoration projects. Actual road miles surveyed would be less than those displayed.*

In addition, surveys for project-related activities which may have an adverse impact on sensitive plants or highly suitable habitat would be conducted prior to implementation of those activities. Specific protection measures, as detailed in Chapter II, would be implemented to protect any newly documented population and its habitat.

Consistency With the Forest Plan and Other Applicable Regulatory Direction

A Forest Plan management goal is to "manage habitat to maintain populations of identified sensitive species of animals and plants" (Forest Plan, II-1). A Forest Plan standard for sensitive species is to "manage the habitat of species listed in the Regional Sensitive Species List to prevent further declines in populations which could lead to Federal listing under the Endangered Species Act" (Forest Plan, II-28). The Forest Plan also identifies the need to "Determine the status and distribution of Threatened, Endangered and Rare (sensitive) plants on IPNF" (Forest Plan, II-18). All of the proposed activities with the requirements for surveys and implementation of mitigation measures would meet the intent of the Forest Plan. The No Action Alternative would also meet the intent of the Forest Plan.

NOXIOUS WEEDS

REGULATORY FRAMEWORK

Federal legislation, regulations, policy and direction that require development and coordination of programs for the control of noxious weeds, and evaluation of noxious weeds in the planning process include: The National Forest Management Act (1976); the National Environmental Policy Act (1969); Forest Service Manual (Chapter 2080, as amended, (1995); Executive Order #13112 (February 1999); Idaho Panhandle National Forests, Forest Plan (1987); and the Idaho Panhandle National Forests Weed Pest Management EIS (1989).

The Forest Service Handbook (FSH 3409), on Forest Pest Management defines a strategy for managing pests, including noxious weeds, as "A decision-making and action process incorporating biological, economic, and environmental evaluation of pest-host systems to manage pest populations". (FSH 3409.11, 6/86) This strategy is termed Integrated Pest Management (IPM). The Forest Plan provides the following direction for implementing an Integrated Pest Management program: "Noxious weed control will be based on an integrated pest management approach, which includes but is not limited to the current practices of inventory, monitoring, some hand-pulling, and some biological control. Noxious weed control will be conducted in cooperation with counties, other agencies, and private landowners." The overall IPNF strategy is to contain weeds in currently infested areas and to prevent the spread of weeds to susceptible but generally uninfested areas.

The 1989 Final Environmental Impact Statement for Weed Pest Management (Idaho Panhandle National Forests) describes the management strategy. An updated management strategy for the Coeur d'Alene River Ranger District was proposed in the "Noxious Weeds Draft Environmental Impact Statement," released to the public in October, 1998. The final environmental impact statement and record of decision for noxious weeds is a reasonably foreseeable future action listed in Appendix E of the Final EIS.

Noxious weeds are those plant species that have been officially designated as such by Federal, State, or County officials. In *Weeds of the West* by Whitson et al. (1992), a weed is defined as "a plant that interferes with management objectives for a given area of land at a given point in time." The Federal Noxious Weed Act of 1974 defines a noxious weed as "a plant which is of foreign origin, is new to, or is not widely prevalent in the United States, and can directly or indirectly injure crops or other useful plants, livestock or the fish and wildlife resources of the United States or the public health" (P.L. 93-629). The Idaho Noxious Weed Law defines a "noxious weed" as any exotic plant species established or that may be introduced in the State which may render land unsuitable for agriculture, forestry, livestock, wildlife, or other beneficial uses and is further designated as either a State-wide or County-wide noxious weed (Idaho Code 24 Chapter 22). Both Federal and State laws define noxious weeds primarily in terms of interference with commodity uses of the land. However, the impacts of noxious weeds on non-commodity resources such as water quality, wildlife and natural diversity are of increasing concern.

AFFECTED ENVIRONMENT

Characterization

The recent scientific assessment of the Interior Columbia Basin found that herbaceous and shrub wetland vegetation types in the Upper Columbia River Basin (including riparian habitats) have declined in area from historical conditions, in part due to invasion by certain noxious weed species (Quigley and Arbelbide 1997). Wetland habitat in the analysis areas is also vulnerable to decline from encroaching weeds. Rangelands and dry forest types within the analysis areas and surrounding region were described in the above assessment as having low ecological integrity, again in part due to noxious weed invasions (Quigley, Haynes et al. 1996).

The spread of noxious weeds can primarily be attributed to human-caused dispersal such as vehicles and roads (Roche and Roche 1991), contaminated livestock feed, contaminated seed, and ineffective revegetation practices on disturbed lands (Callihan et al. 1991). Vallentine (1988) explains that some of the worst noxious plant problems are caused by weed species such as leafy spurge, Canada thistle, the knapweeds, and dalmatian toadflax. The introduction of these and other noxious weeds has occurred throughout the Coeur d'Alene River Basin, especially in urban and agricultural areas, along major highways and travel routes, and areas within the forest that have experienced disturbance from intense recreation, roading, and timber harvest (USDA Forest Service, Toward An Ecosystem Approach: An Assessment of the Coeur d'Alene River Basin, February, 1998, pages 39-40). Non-native species can impact the native flora and reduce native biodiversity, especially in diverse habitats like riparian zones, sensitive communities like wetlands, or inherently rare communities like subalpine balds, fens and seeps.

Roads and trails serve as corridors for the dispersal of many noxious weed species. Roche and Roche (1991) discuss the historical perspective of meadow knapweed invasion in the Pacific Northwest and cite many older studies documenting the influence of road systems. Noxious weed seeds and plant parts are moved along road systems by vehicles, people, wildlife and livestock, allowing the establishment of noxious weeds into previously uninfested areas. Many of the road systems within the project area contain infestations of noxious weed species such as spotted knapweed, hawkweeds, and goatweed.

In disturbed forested habitats, most weed species tend to proliferate in early successional stages and are reduced in density as canopy cover closes (Zack 1999). However, in the interim, these transitory populations serve as seed sources for continued species expansion. Some species, such as spotted knapweed, produce large quantities of seed, which may remain dormant in the soil for many years until disturbance from fire, timber harvest or other disturbance provides favorable conditions for their germination and growth.

Existing Condition

Since the 1989 release of the Idaho Panhandle National Forests' Final EIS for Weed Pest Management, there has not been a strong noxious weed program on the Coeur d' Alene River Ranger District. Efforts mainly have been focused in the southwestern corner of the district, a few recreation areas and a limited amount in resource areas where funding is available. In 1990, a Memorandum of Understanding was signed between the district and Kootenai County to concentrate efforts at controlling weeds entering the county from the south. Herbicide control was used on several roads in this area beginning in 1992. Weeds were effectively reduced in number when funding allowed for multiple-year treatments. One site of leafy spurge, a new invader in the northeastern portion of the District, is treated each year by the county to control its spread.

Until 1996, weed surveys were limited on the Coeur d' Alene River Ranger District. In 1996, noxious weed surveys were conducted at 76 sites. Over 1,800 acres of potential habitat for infestation were documented for these sites, with an estimated 822 acres of actual infestation. The major species of concern identified include:

- meadow hawkweed (*Hieraceum pratense*)
- spotted knapweed (*Centaurea biebersteinii*)
- orange hawkweed (*Hieraceum aurantiacum*)
- dalmatian toadflax (*Linaria genistifolia* ssp. *dalmatica*)
- Canada thistle (*Cirsium arvense*)
- goatweed (*Hypericum perforatum*)
- oxeye daisy (*Chrysanthemum leucanthemum*)
- common tansy (*Tanacetum vulgare*)

Other species considered for treatment include leafy spurge (*Euphorbia esula*), hound's-tongue (*Cynoglossum officinale*), rush skeletonweed (*Chondrilla juncea*), yellow toadflax (*Linaria vulgaris*), blueweed (*Echium vulgare*),

sulfur cinquefoil (*Potentilla recta*), purple loosestrife (*Lythrum salicaria*), bull thistle (*Cirsium vulgare*), yellow star thistle (*Centaurea solstitialis*), musk thistle (*Carduus nutans*), and diffuse knapweed (*Centaurea diffusa*).

There is one known site each of leafy spurge and purple loosestrife on the Coeur d'Alene River Ranger District.

Many of the weed species listed above are present in the project area, mainly along roads, trails, in grazing allotments and at recreation sites. The most common species within the analysis areas include meadow and orange hawkweed, spotted knapweed, dalmatian toadflax, Canada thistle, goatweed, common tansy, and oxeye daisy.

The suitability of a site to weed invasion depends on the weed species, climatic factors that are expressed in the cover vegetation type, and the type of activity, when applicable. Table C-1 in Appendix C, adapted from the recent scientific assessment of the Interior Columbia Basin, displays susceptibility of the Coeur d'Alene subbasin project area's major vegetative community types to invasion by several weed species of concern.

Vegetative communities within the Coeur d'Alene subbasin vary from dry and semi-dry to moist forest habitats and wetlands. A description of these communities can be found in Appendix C, along with a discussion of these communities' susceptibility to weed invasions.

A substantial amount of recent bark beetle activity and the majority of proposed treatments are in the Douglas-fir and grand fir forest cover types, with some activity in hemlock, white pine, ponderosa pine, cedar, western larch and lodgepole pine cover types.

Dry community types, as shown in the table, are highly susceptible to weed invasion from such species as spotted knapweed, dalmatian toadflax, and goatweed. These species are currently infesting many sites in the project area. A high percentage of forest cover types in the project area are of the Douglas-fir type, particularly in the Hayden, Coeur d'Alene and Chain Lakes analysis areas. Grazing in allotments within these analysis areas also contributes to weed spread. In the Chain Lakes goatweed is infesting big game winter range and competing with native plant communities in dry Douglas-fir/ponderosa pine forest types.

The diverse habitats and shifting dynamics of riparian zones make them uniquely susceptible to weed invasions; the richest plant communities along a river system are the most vulnerable to invasion (Planty-Tabbacchi et al. 1996). Research has shown that the number of native species, as well as their total biomass, would decrease within locations infested by noxious weeds. Orange and meadow hawkweed, knapweed, blueweed, purple loosestrife, and common tansy are common riparian area invaders in the subbasin. Weeds have been brought into these areas by vehicle travel on roads and cattle grazing. Drainages provide a means of dispersing weed seeds for long distances. Sensitive plants are at risk of losing suitable habitat and being outcompeted by weeds in riparian areas, as the majority of Coeur d'Alene Ecosystem sensitive plants occur in these habitats.

As shown in Table C-1 in Appendix C, certain cover types have a high degree of vulnerability to invasion by several weed species. A "high" risk rating indicates that a particular weed can successfully establish and become dominant in a cover type in the absence of intense or frequent disturbance. Weed species considered *invaders* in some of the beetle-affected forest cover types include spotted knapweed, diffuse knapweed, musk thistle, bull thistle, Canada thistle and sulfur cinquefoil.

Other weed species are considered *colonizers*, able to invade and establish in certain cover types after soil disturbance or canopy removal. Beetle-affected forest cover types within the analysis areas fall into this "moderate susceptibility" category for many weed species of concern, including oxeye daisy, dalmatian toadflax, orange and meadow hawkweeds, leafy spurge and yellow starthistle.

Based on the information on susceptibility of broad scale cover types, the table below represents the amount of habitat vulnerable to invasion by one or more weed species. Acres under Alternative A are the cover types predicted to result from beetle activity alone. Acres under Alternatives B through G are those cover types predicted to result from proposed treatments, and are a subset of those under Alternative A.

Table III-32. Acres of susceptible vegetative cover types, by alternative.

Forest Cover Type	Alt A*	Alt B	Alt C	Alt D	Alt E	Alt F	Alt G**
Interior Douglas-fir	18,287	5,914	5,914	7,391	5,914	4,642	576
Interior ponderosa pine	471	166	166	234	166	155	202
Grand fir	4,886	2,491	2,491	2,909	2,491	2,001	337
Lodgepole pine	18	17	17	17	17	11	0
Western redcedar	631	371	371	374	371	202	0
Western larch	573	272	272	275	272	182	0
Western hemlock	682	371	371	375	371	262	0
White pine	106	53	53	56	53	40	0
Total acres	25,654	9,655	9,655	11,631	9,655	7,495	1,115

**Stands included under Alternative A are beetle-affected areas characterized by cover types which have a "high" risk rating for weed invasion--those cover types in which one or more weed species may invade in the absence of intense or frequent disturbance.*
***Alternative G acreage includes stands that are proposed for underburning which have a high risk rating for weed invasion.*

ENVIRONMENTAL CONSEQUENCES

Methodology

Analysis was conducted using results of past noxious weed surveys, current distribution of weed species in habitats similar to those found in the proposed treatment sites, types of proposed treatments and the risk of weed spread and introduction of new weed invaders from the proposed activity, based on current knowledge and professional judgement.

Indicators used to measure impacts on weed spread and introduction include the number of acres proposed for ground-based timber harvest and/or fuels treatment, the number of miles of proposed new road construction and reconstruction, and the proximity of proposed treatment areas to known weed infestations.

Direct, Indirect and Cumulative Effects at the Analysis Area Scale

For noxious weeds, effects were not addressed at the analysis area scale but were addressed at the project area scale.

Direct, Indirect and Cumulative Effects at the Coeur d'Alene Project Area Scale

Effects Common to All Action Alternatives

Direct and Indirect Effects

Areas of ground disturbance in susceptible habitats are at risk for weed invasion, particularly when ground disturbing activities occur near existing infestations. Different management activities vary in the level of risk for weed invasion on affected sites. There would be little direct effect to noxious weeds due to activities, most effects would be indirect or cumulative in nature. Noxious weed Features and Mitigation Measures for all action alternatives (Chapter II) would help reduce, but not eliminate, the risk of weed spread due to proposed activities.

The project area would be evaluated for opportunities to treat weed infestations if KV funding becomes available with implementation of an action alternative.

Timber harvest, road construction/ rehabilitation and burning would have the greatest risk of introducing and spreading weeds in the project area.

Timber harvest is a feature of all action alternatives except Alternative G. Selective timber harvest would remove approximately 30% of the tree canopy, allowing for increased understory vegetation growth, including noxious weeds. Helicopter harvest of beetle-killed trees with no site preparation or ground-based fuels treatment, as in some salvage units, would not differ significantly from the No Action Alternative in direct or indirect effects. Salvage using ground-based systems would carry with it a greater risk of weed introduction. Ground-based harvest, regardless of the harvest prescription, leads to soil disturbance and increased susceptibility to weed introduction. Regeneration treatments remove a significant portion of the canopy (greater than 70%), and would treat fuels with site preparation, so this type of harvest carries an even greater risk in terms of weed spread, particularly when in proximity to existing infestations. The effects of commercial thinning would be similar to those of salvaging.

Ground-based mechanical fuels treatment would disturb the soil and provide areas for weed invasion, with no further prevention measures. There is also the potential for equipment to spread weed seeds from infested sites to newly disturbed ground.

Road construction, reconstruction, reconditioning, obliteration, fuel break construction and **fireline construction** would cause soil disturbance. Since most roads in the project area are already weed- infested, there is a risk of indirectly introducing noxious weeds into newly disturbed sites. Road construction could link already infested sites to further increase weed spread. This occurs by means of equipment, animals, off-road vehicles and other vehicles. Since most of the project area roads would be temporary, rehabilitation would occur, such as ripping and grass seeding, prior to road closure, therefore reducing the risk of invasion.

While **prescribed fire** would directly affect some weeds, it may indirectly affect some habitats, making them more susceptible to weed invasion. Goatweed has been found to increase on burned sites (USDA 1998). Prescribed fire would be used mainly to prepare regeneration harvested units for planting. Exposure of some mineral soil is possible in regeneration units, thereby creating a seed bed for weed introduction. Though many of our common weeds invade after site preparation, they tend to decrease as the site becomes stocked with planted conifers and native vegetation. This is a long-term process of vegetation succession, taking up to 20-30 years or more to achieve canopy closure. In Alternatives F and G, prescribed fire would be used extensively both within and outside the boundaries of harvest units. The objective of these fires would be to reduce smaller diameter fuels with a low intensity burn. There would be a risk of escaped fires that could burn hotter, thereby increasing the spread of certain species such as goatweed on susceptible acres, however, burning prescriptions would minimize those risks.

Cumulative Effects

While existing infestations of certain weed species may continue to increase on Federal lands and adjacent private lands, proposed activities in action alternatives would minimize the risk of weed spread by application of the noxious weed Features Common to All Action Alternatives, Chapter II. Weed treatment and prevention practices as proposed would minimize, but not eliminate, the risk of weed spread. The Forest Service does not have control over activities occurring on private lands; weed introduction and spread is likely occurring.

Foreseeable Actions

A list of reasonably foreseeable and ongoing projects in Coeur d'Alene River Ranger District is included in Appendix E. Projects include weed treatment, timber harvest on federal, State and private lands, repairs and

resurfacing on county and Forest Service roads, wildlife burns, recreation and road access, grazing allotments and slash disposal. Additional weed treatment would be considered in the Douglas-fir beetle project area pending completion of a Final Noxious Weed EIS and Decision.

Implementation of foreseeable future and current actions on National Forest lands will, in most cases, have a low level of cumulative impacts on the risk of weed spread, since the Coeur d'Alene River Ranger District is committed to implementing treatment and prevention practices as described in Chapter II - Features Common to All Action Alternatives on all current and future projects where ground or vegetation disturbance and/or canopy removal would occur.

Effects Common to Alternatives B, D and F

Direct and Indirect Effects

With respect to timber harvest, all of these action alternatives propose regeneration harvest. Alternatives B, D and F would do this type harvest on a minority of sites, approximately 10% of the acreage for any of these action alternatives. Proposed activities in these action alternatives would minimize the risk of weed spread by application of the Noxious Weed Features stated in Chapter II.

Effects Common to Alternatives D and F

Cumulative Effects

Cumulative effects in terms of noxious weeds would be the greatest for Alternatives D and F because of the high level of harvest and other ground-disturbing activities such as fuel break and road construction. Cumulative effects would be low to moderate for these alternatives.

Alternative A (No-Action)

Direct and Indirect Effects

With the No Action Alternative, there would be a natural reduction in forest canopy cover due to the activity of Douglas-fir bark beetle induced mortality. The extent of the effects are likely to cover approximately 13,000 acres, which is the acreage included in Alternative D that is already infested, or at high risk to be infested, by bark beetles. Canopy loss would make conditions in the dry Douglas-fir cover type in analysis areas more suitable to certain common weed species such as goatweed and spotted knapweed. Where these species are already present in affected areas, they would likely increase. However, these effects would be limited because of the lack of ground disturbance occurring with this natural event. The direct effect of the loss of canopy and resulting indirect effect of increased light and a warmer, drier micro-environment, would be most pronounced on dry, Douglas-fir cover types and habitat types. There would be little direct, indirect, or cumulative effect to moist forest and riparian habitats. In habitats with a developed shrub layer, the shrub cover would increase, limiting the risk of weed encroachment. Douglas-fir cover types with grass-forb understories would be affected to a greater degree by invading weeds.

Cumulative Effects

Cumulatively, areas where continued beetle induced mortality results in significant canopy loss would be at greater risk of weed spread, particularly in dry habitats which are already open to semi-open and dominated by grass-forb understories. Stands with high mortality due to bark beetles would have heavy fuel loads; future wildfires in these stands would be of a higher intensity, which could lead to further canopy loss, exposure of mineral soils and an increased risk of weed spread. The cumulative effects of Alternative A are expected to be low to moderate.

Alternative B

Direct and Indirect Effects

Direct and indirect effects of this alternative are discussed above. There are no additional effects specific to Alternative B.

Cumulative Effects

Cumulative effects would be low. Harvest treatments would generally focus on salvage of trees which would be killed by Douglas-fir bark beetles. In units with helicopter yarding as the fuels treatment, ground disturbance would be minimized. Cumulative effects in such treated areas would not differ significantly from those resulting from beetle activity.

Alternative C

Direct and Indirect Effects

Alternatives B and C would be very similar in direct, indirect and cumulative effects in terms of noxious weeds, because harvest treatments would be essentially the same. Alternative C would do regeneration harvest on a minority of sites, approximately 10% of the acreage. The main difference would be that in Alternative C, no new roads would be constructed. This only amounts to a slight difference, though, since the mileage of reconstruction and reconditioning would be about the same.

Cumulative Effects

Cumulative effects would be low. Harvest treatments would generally focus on salvage of trees which would be killed by Douglas-fir bark beetles. In units with helicopter yarding as the fuels treatment, ground disturbance would be minimized. Cumulative effects in such treated areas would not differ significantly from those resulting from beetle activity.

Alternative D

Effects of this alternative were discussed above as those common with Alternative F and with alternatives B and F. There would be no additional direct, indirect or cumulative effects.

Alternative E

Direct and Indirect Effects

Alternative E would most closely approximate the No Action Alternative, in terms of harvest and risk of indirect effects to noxious weeds, because only beetle-killed trees would be removed. There would be only salvage harvest, with no regeneration harvest and its associated risk of weed invasion with site preparation. There would, however, be some underburning for fuels reduction on some acres.

Cumulative Effects

Cumulative effects would be low. Harvest treatments would generally focus on salvage of trees which would be killed by Douglas-fir bark beetles. In units with helicopter yarding as the fuels treatment, ground disturbance would be minimized. Cumulative effects in such treated areas would not differ significantly from those resulting from beetle activity.

Alternative F

Direct and Indirect Effects

Alternative F would harvest the fewest acres, with similar proportions of helicopter versus skyline, tractor yarding and road treatment activities to the other action alternatives. Harvested acres would be focused near the urban interface to reduce overall fire risk due to the effects of the Douglas-fir bark beetles. Underburning would be carried out on about 70% of all harvested acres, and approximately 1,600 acres would be burned to promote wildlife habitat and reduce natural fuels accumulations. This alternative would carry an inherent risk of weed spread on fire-treated acres due to some chance of exposure of mineral soils with burning and the various methods of fuel break and fireline construction.

Cumulative Effects

Cumulative effects for this alternative were addressed above as those in common with Alternative D.

Alternative G

Direct and Indirect Effects

Alternative G would have no effects to noxious weeds from timber harvest; however, there is potential for direct and indirect effects from underburning on approximately 1,100 acres for wildlife habitat enhancement and natural fuels reduction. There would also be extensive implementation of watershed restoration work, primarily culvert replacement and road obliteration with this alternative. These types of activities carry a moderate to high risk of weed spread, but noxious Weeds Features (Chapter II) would help reduce weed spread with seeding of disturbed soils and washing equipment as in contract clause CT 6.26.

Cumulative Effects

Cumulative effects would be low, with application of noxious weed Features and Mitigation as proposed (Chapter II).

Effects of Opportunities

Watershed restoration projects such as road obliteration, removal or improvement of stream crossings and placement of instream structures to benefit fish habitat could increase the risk of weed spread and of new invasions through moderate levels of soil and vegetation disturbance. Weed treatment and prevention practices as proposed (Features Common to All Action Alternatives, Chapter II) would reduce this risk. In addition, removal of problematic road segments would reduce or eliminate chronic erosion of topsoil which can discourage establishment of native species and encourage invasion of weed species which readily establish on disturbed soils. Removal of unneeded roads and road segments also reduces the availability of travel corridors which hasten the spread of weeds from vehicle traffic.

Weed treatment and prevention projects would be conducted in accordance with the Noxious Weed Features for the Coeur d'Alene River Ranger District, Chapter II, Final EIS. Additional weed treatments will be considered in the project area pending completion of the Coeur d'Alene River Ranger District Noxious Weeds Draft EIS (USDA 1998).

Timber stand improvement work would have no appreciable effect on the spread of weeds.

Consistency With the Forest Plan and Other Applicable Regulatory Direction

According to the Idaho Panhandle Forest Plan (1987) direction, infestations of many noxious weed species, including knapweed, goatweed and common tansy, are so widespread that control would require major programs that are not possible within expected budget levels (Forest Plan, p. II-7). Forest Plan direction is to "provide moderate control actions to prevent new weed species from becoming established". All alternatives proposing harvest activities within the IPNF, with the provisions for minimizing weed spread (Features Common to All Action Alternatives, Chapter II), would meet the intent of the Forest Plan. Alternative A (No Action) would also meet the intent of the Forest Plan.

WATERSHED

REGULATORY FRAMEWORK

The regulatory framework for the watershed and water resources aspect of the analysis is based on the Clean Water Act and its amendments; Idaho State's implementations of the Clean Water Act; the Forest Plan, and the Inland Native Fish Strategy (INFS).

Activities will be in compliance with the guidelines in the Soil and Water Conservation Handbook (Forest Service Manual 2509.22), which outlines Best Management Practices that meet the intent of the water quality protection elements of the Idaho Forest Practices Act.

AFFECTED ENVIRONMENT

Pre-Settlement Conditions

When the first settlers arrived in the 1800's, the landscape of the Coeur d'Alene River Basin was quite different than it is today. The Basin had been shaped by a long history of natural events including fires, floods, and various geologic processes. The streams and rivers of the Coeur d'Alene Basin had developed in response to these naturally-occurring disturbance patterns. They were stable and resilient for several reasons. Geologically, quartzitic Belt rocks dominate most of the basin. Hillslope soils developed from these rock types are less prone to erosion and mass movement than granitic sands found elsewhere in Idaho. Historic vegetation also contributed to stable, healthy streams. Streamside (riparian) areas were well-vegetated with large conifers and other plant communities. These communities had well-developed root systems which held stream banks together during high flows while providing shade and cover for the native fish and other aquatic life. Large woody debris in the streams stored sediment, reduced stream velocity during high flows, and provided instream cover for fish and other organisms. Together, these factors helped maintain healthy aquatic systems. The streams and rivers were well-adjusted to natural disturbances, particularly floods and fires.

Flooding has always been important in the Coeur d'Alene Basin. Historically, floods of some magnitude occurred one to four times in any ten year period. Larger floods occurred less frequently. Rain-on-snow events, which contributed to many of the larger floods, were very important hydrological processes. Rain-on-snow events occur when a large warm, moisture-laden air mass moves in over an extensive snowpack that is already on the verge of melting. As the warm airmass moves upslope it condenses forming rain and fog. Because they are above the freezing point, rain and fog can trigger very rapid snowmelt, and the combined effect of rain and melted snow produces very high runoff in a short time. A large percentage of the mountainous area of northern Idaho lies between 3,000 to 4,500 feet in elevation, which is very susceptible to rain-on-snow events.

Periodic forest fires also contributed to flooding. High intensity fires in particular would trigger widespread vegetative changes that would ultimately result in rapid changes in streamflow, sediment loading and wood inputs to streams. In the period between catastrophic fires, streams were able to re-adjust to a more stable condition.

Although floods occurred periodically, the streams and rivers had adjusted accordingly and remained relatively stable. Populations of fish and other aquatic organisms in the streams were also well-adapted to these periodic disturbances and were not usually adversely affected by them.

Post-Settlement Conditions

Following settlement in the 1800's, the nature of disturbance changed dramatically throughout the basin. Disturbance from mining, timber harvest, road-building, grazing and other land management activities were added to disturbance from natural events. Roads were constructed up the major stream corridors and eventually into the interior of the basin. Following the 1910 fires, which burned large portions of the Upper Coeur d'Alene Basin, aggressive fire suppression activities were developed and improved on for the next 80 years. These activities and others dramatically altered the disturbance regime in the Coeur d'Alene Mountains.

Hydrologically, streams were not adapted to the combined effects of natural disturbance, land management and fire suppression. On the hillsides, extensive timber harvest would cause large quantities of water, previously used by the trees, to remain in the ground. Miles of associated road networks on the hillsides and in the valley bottoms delivered this excess water more quickly to downstream reaches. In addition, the impact of rain-on-snow events became more severe because openings in timber stands from fire, windthrow, disease and timber harvest were most susceptible to rapid snowmelt conditions. The result was higher peak flows and greater flow volumes than had occurred previously.

Valley bottom areas were also affected. Low-lying riparian areas became some of the most altered landscapes in the Coeur d'Alene Basin. Valley bottoms, which provided natural travel corridors in the mountainous terrain, were generally the first to be settled and converted to agricultural and other uses. Extensive harvest occurred in the large stands of cedar, white pine, larch and cottonwood along the streams and rivers. This loss of large wood in the valleys and streams resulted in degraded fish habitat from loss of instream cover, loss of shade and other factors.

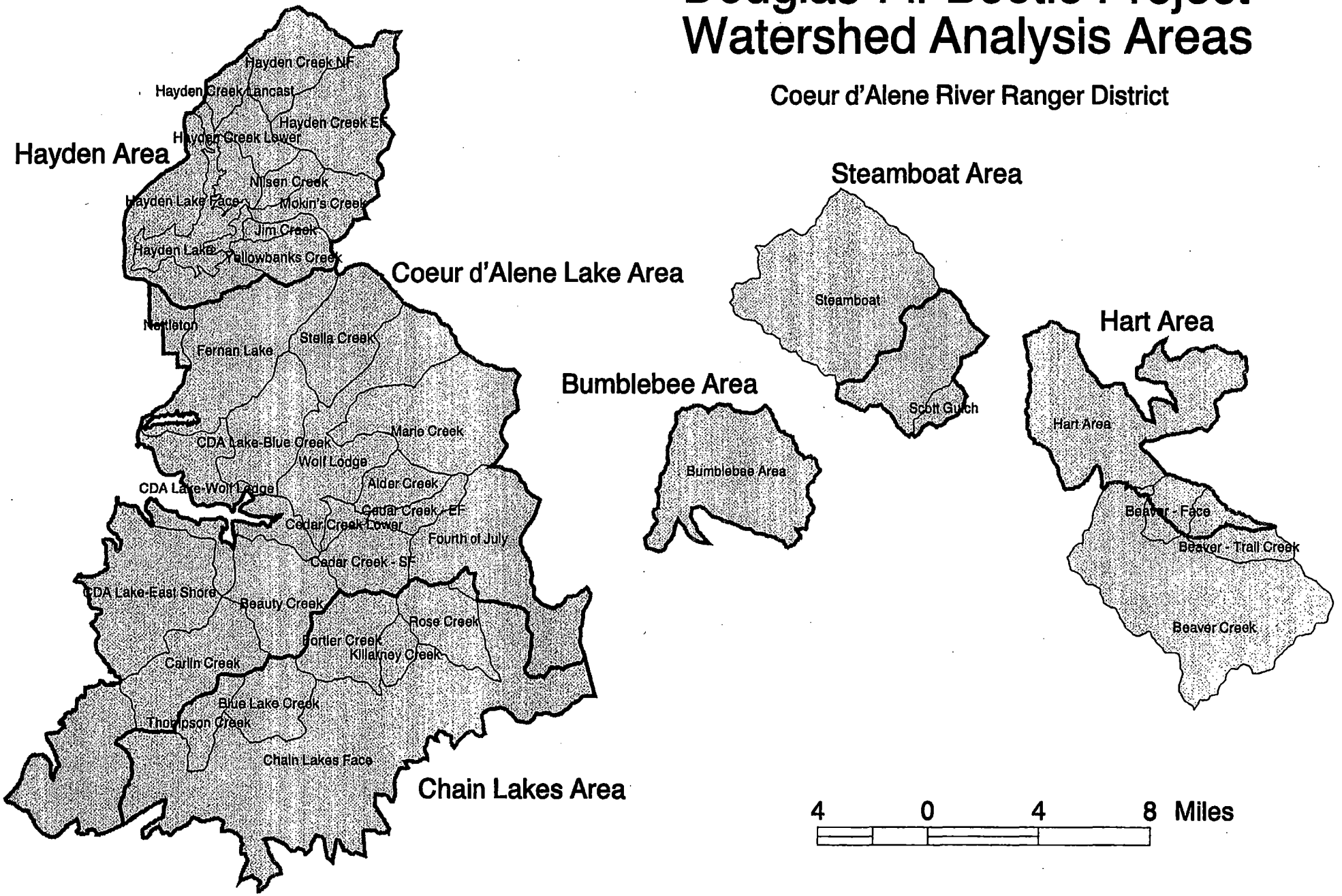
In addition to timber harvest, many roads were built directly adjacent to the streams and rivers. In many cases, this reduced the stream's ability to safely transport water, sediment and other material during flood events. Constriction from encroaching roads also resulted in bank erosion and various forms of stream channel adjustment. Further impacts occurred when streams themselves were used to transport logs to the mill. Early logging and transportation practices included splash dams, flumes, chutes, and other mechanisms to move logs downstream. These practices altered natural flow regimes, channelized and eroded stream banks, compacted soils and often resulted in extensive and long-term loss of large wood to the streams.

The combined effect of natural and management-related disturbance has had an adverse effect on many streams in the Coeur d'Alene River Basin. From both a scientific and management standpoint, some of the most important processes affecting streams are the failure of road fills and stream crossings in close proximity to stream channels. Therefore, the watershed improvements proposed in this document will focus on the effects of roads (both riparian and hillslope) and related impacts. The analysis presented in this environmental impact statement will also address the potential for changes in streamflow as a result of the beetle outbreak.

For a detailed discussion of historic hydrologic conditions, please refer to the Geographic Assessment for the Coeur d'Alene River Basin (USDA Forest Service, 1998).

Douglas-Fir Beetle Project
Watershed Analysis Areas

Coeur d'Alene River Ranger District



Existing Conditions

Introduction

The assessment of existing condition is critical to an environmental analysis because it both describes the current condition of the project area and provides a basis for comparing the effects of management alternatives. This existing condition discussion was developed from many information sources including field surveys, aerial photographs, Geographic Information Systems (GIS), hydrologic response techniques and models such as WATSED, and other watershed and aquatic data derived by the Forest Service and other sources. The assessments followed the principles and processes in the *Ecosystem Analysis at the Watershed Scale: Federal Guide for Watershed Analysis*, Version 2.2, August 1995. (Regional Interagency Executive Committee and the Intergovernmental Advisory Committee, Forest Service and other federal agencies, copies available from Regional Ecosystem Office, PO Box 3623, Portland, Oregon 97208.)

The project areas were first subdivided into manageable watershed units for analysis. Two types of units were identified: true watersheds and composite watersheds. True watersheds are areas of land in which all of the streams are interconnected and drain through a single point. In a true watershed, all of the surface water from the watershed and its tributaries eventually converge to a mainstem channel and leave the watershed through a distinct outlet or "pore point." For example, the Beaver Creek watershed consists of Dudley Creek, Ferguson Creek, Moore Gulch, Alder Creek and all of the other small drainages that contribute water to Beaver Creek. A watershed can also drain into a lake, as in the case of Hayden Lake. True watersheds identified in the project areas include Hayden Lake, Fernan Lake, Wolf Lodge, Carlin Creek, Beauty Creek, Cedar Creek, Steamboat Creek and Beaver Creek.

For purposes of analysis, some "composite watersheds" also were used. These consist of smaller independent watersheds grouped together. Streams in composite watersheds are not as directly interconnected as those in true watersheds. For example, Cottonwood Creek, Killarney Creek and Rose Creek are small independent streams that were grouped into the Chain Lakes analysis area. Composite watersheds in the project area include the Coeur d'Alene Lake face drainages, Chain of Lakes, Bumblebee, and Hart areas. These are referred to as "watershed areas."

Watershed Processes

There are several primary physical processes that affect the behavior of a watershed and its associated stream network, Several of these watershed processes have affected the existing condition of the watersheds in the Coeur d'Alene basin.

1. ***Water yield changes through vegetative changes:*** Water yield describes the changes in the rate, frequency, and timing that a watershed exhibits in response to runoff from hydro-climatic events such as rainfall and snow melt. Changes in peak flow is often used to measure the effects of vegetative changes on water yield. Patterns of regeneration harvest, large stand-consuming fires, and forest insects and diseases can alter snowmelt patterns because of vegetation changes on the slopes, These changes in snowmelt patterns can result in higher peak flows earlier in the spring.

2. ***Increased peak flows through extended channel networks:*** Forested watersheds like the North Fork Coeur d'Alene River typically transport runoff subsurface until it reaches a stream channel. As long as the water movement is subsurface, the rate of movement is relatively slow compared to free water flow on the surface. A watershed has a network of channels that expand in length (and width) as a substantial runoff event occurs. As this network expands, such as during the spring snow melt, not only is more water being moved, but it is also moved faster.

Roads, (landings and excavated skid trails), especially those on steeper landtypes, have often been excavated to a depth which intercepts the subsurface water. This water flows on the surface until it either infiltrates the ground or reaches a stream channel.

Many watersheds and subwatersheds of the North Fork Coeur d'Alene River system (and much of the entire basin) have exceptionally high road densities. Where the associated landtypes are susceptible to interception of subsurface slope water by those roads, there is a potential for substantial expansion of the channel network and contributing areas during runoff-producing events.

3. ***Rain-on-snow events and watershed responses:*** From the North Fork of the Clearwater River to the Canadian border, northern Idaho experiences a strong maritime influence with warm moist weather fronts invading in the winter from the Pacific Coast. These relatively warm and moisture-laden air masses are frequent and have a profound effect on the climate and hydrology of the Coeur d'Alene River basin. As a result, midwinter snowmelt, thaws, and rainfall are common in the region.

   Both the South and North Forks of the Coeur d'Alene River are particularly susceptible to rain-on-snow events. In northern Idaho, the snowpack within the 3,000 to 4,500-foot elevation range is most susceptible to rain-on-snow events. Below 3,000 feet, the snow pack often may accumulate and abate several times during the season and not be a substantial contributor to overall basin runoff. In many years the snow pack above about 4,500 feet is usually "cold" and less susceptible to rain-on-snow events.

   Rain-on-snow is a natural process under which the streams of the basin developed. The historic streams of the basin were very stable and resilient because they developed in response to the variability of the climatic processes and the dominant geology of the basin. Rain-on-snow events probably did not cause the loss of main stream equilibrium historically. Changes in vegetation resulting from management or natural events can affect the frequency and magnitude of rain-on-snow events.

4. ***Direct delivery of bedload materials from the hillslopes to streams:*** Perhaps the most important process influencing the Coeur d'Alene River and its tributaries is the failure of roads, road fills, landings, and other encroachments in close proximity to streams. When these fail and the slope is capable of transporting the debris (i.e. on steep slopes or on slopes dissected by frequent streams and draws), sediment and debris is delivered into stream courses.

5. ***Direct riparian and instream disturbances:*** Logging practices and other management activities in riparian areas and stream bottoms have frequently resulted in adverse effects. These activities have caused extensive and long-term loss of large wood-replacing vegetation, stream channelization and changes of alignment, loss of structural components, compaction of soils, and other hydraulic modifications.

   Roads and other facilities in valley bottoms inevitably encroach on the stream channel and its floodplain and low terraces. This encroachment creates a constriction in the normal stream environment. Consequently, large streamflows are forced through a smaller (constricted) channel and floodplain than it was "designed" for after thousands of years of floods. The smaller channel results in deeper water flows causing flooding and an increased velocity of flows. This in turn results in accelerated bed scour and bank erosion. The resulting sediment and can cause abnormal drastic and prolonged channel adjustments which may even trigger new adjustments downstream. These disturbances cause a loss of stream equilibrium, which is extensive in both the North Fork and South Fork of the Coeur d'Alene and several of their tributaries.

The physical processes that affect the North Fork Coeur d'Alene River also affect the South Fork. However, they are often masked by the mining disturbances in the South Fork. A concern is that, as the minerals-related modifications are mitigated and improved, the effects of these other physical processes may impede full recovery. A more thorough discussion of each of these processes is provided in the "Watershed Characterization" report of the Geographic Assessment.

Current conditions in each of the watersheds are described below. The description of existing watershed conditions includes several terms from the Geographic Assessment:

- ***Properly functioning:*** *Within the scope of this assessment, a properly functioning watershed system is one that is exhibiting dynamic equilibrium characteristics and whose streams are operating and responding appropriately under their current environment. These systems can absorb and respond to disturbances that they have evolved under within their historic range. Typically, parts of these systems, or the system as a whole, can move toward a more stable condition over time following a disturbance (or a series of disturbances) within a certain time period. As a system, these watersheds will not benefit from large scale watershed restoration actions (although local, site specific improvements may be productive.)*

- ***Functioning-at-risk:*** *A watershed system that is functioning-at-risk is one that is essentially still properly functioning. However, it may be exhibiting trends or it may contain known risks that are likely to compromise that status and the ability to fully support beneficial uses in the future. This status may be assigned where the apparent watershed status is uncertain because the complexity of the system and disturbances. These systems are the first priority for large scale watershed system restoration and improvement programs. Such programs will often produce effective and timely responses in the near future.*

- ***Not properly functioning:*** *Watershed systems that are not properly functioning often exhibit rapid adverse trends and may not fully support beneficial uses. These systems may appear to be responding to their own last adjustment, rather than toward stabilizing the last disturbance. They are "out-of-balance" with their environment and may not be in dynamic equilibrium, in periods of at least several decades. These systems are in need of large scale restoration. These watersheds are usually second priority due to limited availability of resources, uncertain technology, and the long time period expected for positive responses.*

Methodology Used to Describe the Existing Conditions

Each watershed or watershed area that was analyzed in the project is characterized in the tables of Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances. Each entry section is described here, and a summary of the methods used to derive it. "Watershed" refers to true watersheds that are defined by drainage divides and where surface water flows pass through a single location at the lowest elevation of the affected watershed. In some cases, a project area is delineated by composite watersheds that include several very small adjacent, but independent watersheds or lake face lands. These are referred to as "Watershed *Areas*."

Each of the project areas assessed were analyzed from at least two scales: the local site or tributaries where activities take place; and the cumulative effect watershed. The cumulative effect watershed (or watershed area) is the logical culmination point of water flow where the effects of the distributed project activities could possibly integrate or synchronize over time and space and be addressed cumulatively in a larger watershed. The cumulative effects analysis includes an analysis of past, present, and reasonably foreseeable activities.

In each case, the direct, indirect, and cumulative impacts related to the alternatives of this project on watershed, water, and streams were usually local in nature, and sometimes to the next larger tributary formed by multiple tributaries. In no case will the cumulative effects extend beyond the watershed or watershed areas.

Typically the physical effects of runoff modifications, sediment loading, and water temperature, if they occur in projects of this scale, are immeasurable and/or not observable at large watershed and subbasin scales. This results from desynchronization (individual tributaries respond at different times of the year or may be slower to respond than others to disturbance events); the inherent large range of variability that watershed processes operate within years and under which they have evolved and adjusted; and the fact that watershed systems are dynamic in nature.

Dynamic watershed systems assimilate and adjust naturally to disturbances. They typically have a tremendous capability to absorb impacts and re-adjust in a relatively short period of time. Some disturbances can alter the rate and magnitude of those adjustments. Those altered adjustment rates, or more frequent adjustments, can affect local beneficial uses. If the adjustment capabilities of the local watershed is "overwhelmed," or multiple local affected tributaries are synchronized, the adjustments begin to take place in the parent watershed.

In every case, the adjustments of the watershed to any effects of the project activities individually or cumulatively are expected to remain within tributaries of the cumulative effect watersheds or watershed areas. No physical response would extend to or be measurable in the Coeur d'Alene River or Coeur d'Alene Lake below the project watersheds or in the Spokane River.

Lake Coeur d'Alene flows into the Spokane River which eventually combines with the Upper Columbia River far downstream. No effects would reach either point. Moreover, no effects of the Coeur d'Alene Area projects would combine with the lower Pend Oreille River (Newport Area) and the Priest River projects at a point lower in the Upper Columbia River.

The following descriptors were used to describe the existing watershed conditions for each watershed in the Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances table:

Physical Characteristics

Each watershed or watershed area is listed by its Hydrological Unit code (HUC). The HUC is a hierarchal watershed classification. For example, the "17" in HUC 17010216 represents the Columbia River Basin. Each successive pair of numbers in the HUC represents the next lower hierarchial watershed area. The U.S. Geological Service defines watersheds up to the 8th digit (4 pairs), which is referred to as the "4th code" HUC, which is the subbasin level. Therefore, 17010304 represents the Coeur d'Alene subbasin. HUC numbers with additional digit pairs indicate watersheds and subwatersheds delineated by the Forests.

The drainage area for the watershed or watershed area is identified in square miles as derived from GIS analyses. Cumulative effects analyses were addressed for the entire watershed at this level. In order to facilitate supportable assessment of forest practices and logging effects, particularly the portion of those assessments that involved watershed modeling, the downstream limit of the analysis watershed was defined at a point where the watershed is essentially defined by National Forest System (NFS) lands. The reason for this adjustment was to maintain the use of the models within the scope that they were calibrated and validated, which is on NFS lands where landtypes have been mapped and disturbance histories (roading and logging) are known to the necessary resolution. The interpretations of modeled estimates for NFS watersheds are combined with other data, analyses, inventories, and other information and professional judgement to address the entire watershed, including that portion downstream of NFS lands.

All National Forest lands have been classified into units known as landtypes which are based on local geomorphology, hydrology, and soils characteristics. Landtypes address physical responses to forest practices, including road development, logging, and fire. Each watershed or watershed area is characterized by the percent of the drainage area that is made up of sensitive landtypes (those that are more susceptible to mass erosion and increased sediment delivery to streams). As a point of reference, watersheds with more than about 30% sensitive landtypes are often very sensitive to cumulative disturbances.

Portions of the Inland Northwest are influenced by the maritime climate from the West Coast. This climatic characteristic, along with local orographics and elevation, often result in winter snowpacks that rapidly respond to warm moist mid-winter storms. These responses are rapid melt and runoff. If a watershed is typically dominated by this snow characteristic, then the watershed is often subject to flashy and rapid mid-winter runoff. Therefore, the percentage of the watershed that supports this sensitive snowpack is a measure that partially characterizes the overall sensitivity of the watershed. As a point of reference, watersheds with a small proportion of sensitive snowpack (less than 30%) do not appear to be very responsive to rain-on-snow events at

the watershed scale. Watersheds with a large proportion (greater than 70%) of sensitive snowpacks are often highly volatile and are very sensitive to other disturbance regimes in terms of runoff from the stream system.

The sensitive landtypes and sensitive snowpack parameters characterize the inherent sensitivity of each watershed based on the natural conditions under which it evolved. These parameters do not change with forest development, and therefore are not carried into the Environmental Consequences section of Chapter III. They do, however, provide a basis and reference point for the watershed effects estimated in the consequences section, as well in the design and location considerations of each alternative.

Qualifications

Section 303(d) of the Clean Water Act[1] requires the States to list water bodies (stream segments and lakes) that do not support beneficial uses, even though BMPs are employed. These are identified as **Water Quality Limited.** If any part of a watershed contains one or more segments that are listed as Water Quality Limited, that is indicated in the table.

The apparent watershed status has been estimated based on known conditions in the watershed, its sensitivity and resilience, and the disturbance history in the drainage. The three descriptors "properly functioning" (PFC), "functioning at risk" (FAR), and "not properly functioning" (NPFC) were described in the previous section and are noted in the table.

In this assessment, tributaries to the analysis watershed or watershed area were used as the primary basis for the analysis of the entire watershed. This may be due to land ownership, data limits, non-forest, and areas dominated by lake or large river lands. The analysis addresses the entire watershed or area, and the more intensely studied subwatersheds used for analysis are listed.

Hydrological Regime

The level of estimated peak flow that is expected to occur on the average about every two years (Q_2) is listed for characterization as cubic feet per second per square mile of drainage area.

The anticipated runoff modification and equivalent clearcut area for a watershed or watershed area were derived from methods documented in the R1/R4 Sediment Guides[2] and the Watbal Technical User Guide[3]; and calibrated on the Idaho Panhandle National Forests. The current runoff modification is shown as a percent of the "natural" peak month discharge and reflects watershed climate patterns and disturbance history. The equivalent clearcut area is used to express the percentage of hydrologic openings in a watershed and accounts for vegetative recovery since the initial disturbance.

[1] *Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, PL 92-500.*
[2] *Cline, Cole, Megehan, Patten, and Potyondy, October 1981. Guide for Predicting Sediment Yields from Forested Watersheds, USDA Forest Service, Northern Region and Intermountain Region.*
[3] *Watershed Response Model for Forest Management: WATBAL Technical User Guide, Rick Patten, 1989, Clearwater National Forest.*

Watershed Hydrologic Response Estimates and WATSED

WATSED is an analysis tool that spatially and temporally organizes some typical watershed response relationships as a result of forest practices. The estimated responses are combined with other sources of information and analyses to determine the findings of probable effects.

Sediment yield (sediment load modification) and peak flow (runoff modification) serve as relative indicators of potential hydrologic responses in the watershed with a specified series of events. The indicators are a limited estimate of the expected relative cumulative watershed sediment budget. The estimate is derived from a model that compiles watershed responses that might result from forest management related disturbances (roading, logging, and burning) over time and space. The percent change estimates are relative to the expected "natural" sediment and peak flows in watersheds with similar geomorphology, climate, and land use. The magnitude of those "natural" values are shown in Existing Conditions section of this chapter, and are used to characterize the undisturbed (by forest activities) watershed.

WATSED estimates a series of anticipated annual values over a period of years. In the tables depicting Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances, the existing condition represents the estimate for 1998, which is prior to any anticipated disturbances related to the proposed activities. The tables depicting the "Projected watershed response" of proposed alternatives represent the WATSED estimates for the year 2006. The year 2006 was used because timber sale contracts are typically completed within five years, and modelled responses typically appear to be concentrated in a five to ten-year period following initiation of the project.

The relative change for both "natural" parameters is by definition none, or zero percent. In most watersheds within this project, the relative changes for both parameters are greater than zero, since the lands involved have been actively managed in the past, and since the responses are calculated by a deterministic model. For perspective, the magnitudes of the two percent change values for each alternative (as well as the existing conditions) reflects a level of stress on the watershed and stream system that has been induced over time. Some watersheds are more resilient to these stresses, and that must be considered in the synthesis of effects that follows. The sediment and peak flow estimates are only part of the information necessary to evaluate effects. In addition, the difference between alternatives with respect to these two estimated response values is relative to the magnitude of the different alternative actions. Rarely, in the region where this model was developed and is used, are differences in estimated sediment less than 10 to 20%, and peak flows less than 5% even detectable in any given watershed due to technical limitations in measurement and the natural variability of these parameters. It appears that most streams and water resource uses usually do not respond measurably to those magnitudes of change unless they are sustained for long periods.

The sediment and peak flow indicators reflect how watersheds with similar conditions and landtypes respond over time to a similar history of disturbance. The forest management activities used to calibrate the model included standard BMPs and Soil and Water Conservation Practices; therefore standard BMPs and Soil and Water Conservation Practices are necessary requirements for maintaining an effective confidence level in the model's use. Non-standard practices, management or natural disturbances not related to forest practices, and site-specific non-standard BMPs must be integrated into the final analysis of watershed response.

The modeled response variables are one basis for estimating effects of an alternative in this project. While associated road development and maintenance, logging, and prescribed burning are a source of one kind of disturbance, watershed restoration and mitigation are another. In order to demonstrate the potential effects of proposed restoration and mitigation actions in an alternative, four "net change" variables associated with the key restoration responses are used.

Models, such as WATSED, are designed to address and integrate a vast and complex number of conditions and organize the evaluation according to rule sets established by the author. In the case of WATSED, the rule sets were based on research, and data and analysis collected locally. The models, however, also include simplifying assumptions, and do not include all possible controlling factors. Therefore, the use of models is to provide one set of information to the technical user, who, along with a knowledge of the model and its limitations, other models, data, analyses, experience, and judgement must integrate all those sources to make the appropriate findings and conclusions.

Erosion and Sediment

The estimated annual sediment for a watershed or watershed area also was derived from methods documented in the R1/R4 Sediment Guides[4] and the Watbal Technical User Guide[5]; and calibrated for the Idaho Panhandle National Forest. The annual sediment load values are reported as tons per year per square mile of drainage area. The current sediment load modification is expressed as a percent of the "natural" sediment load and is based on the history of disturbances and climate patterns in the watershed, .

The road density is reported as the miles per square mile of watershed. Although road density itself does not characterize the likely condition of a watershed, it can serve as an indicator. Generally, road densities are high throughout northern Idaho and a trend toward lower road densities is desired for a variety of resource benefits (ICBEMP science assessment findings). It should be noted that watersheds with lower overall road densities in some cases are in a poorer condition as a result of individual road difficulties. Likewise, watersheds with greater road densities may continue to be in good condition. Therefore, additional road-related characteristics are also considered in this analysis.

Sensitive road density is a measure similar to road density, except that the roads considered are only those on sensitive landtypes. This measure and other road stratifications are able to better explain watershed responses than road density alone.

Channel Conflicts

Within the scope of this project, one of the primary disturbance factors to watershed response is related to roads that encroach on stream channels or floodplains. This encroachment often results in direct erosion, mass failure from undercut fills, opposite bank erosion, channel scour, loss of shade and channel stability elements; and it can inhibit the stream systems' ability to adjust to upstream disturbances and natural events. Miles of road that encroach within bankfull stage (normal flood stage) were inventoried within the geographic scope of the project and tracked through this analysis to provide a basis for value and benefit considerations. Riparian road density is estimated from maps, photos, and GIS to determine road segments within 300 feet of any perennial stream. This is presented in miles per square mile.

Stream Crossings

Watershed restoration within the scope of this project is essentially focused on certain aspects of road disturbances. The number of stream crossings and the risk of failure at inventoried stream crossings was inventoried and tracked. Risk of failure is a function of 1) the probability of failure of the crossing over an assumed design life (20 years); and 2) the cost of the failure to watershed and aquatic resources. Certainly, most failures are event based and do not occur incrementally over time. But, in order to provide a basis for comparison, the risk was calculated and reported as tons of sediment that could be delivered per year over the design life of the crossing. Stream crossing frequency is the number of road crossings divided by the number of miles of stream in a watershed. Finally, the number of inventoried road crossings which create fish migration barriers are listed.

[4]*Cline, Cole, Megehan, Patten, and Potyondy, October 1981. Guide for Predicting Sediment Yields from Forested Watersheds, USDA Forest Service, Northern Region and Intermountain Region.*
[5]*Watershed Response Model for Forest Management: WATBAL Technical User Guide, Rick Patten, 1989, Clearwater National Forest.*

Hayden Lake Analysis Area

Overview

The Hayden Lake watershed is approximately 41,400 acres and is comprised of numerous first, second, and third order streams that drain into Hayden Lake. Hayden Lake is essentially a closed basin - it is not directly connected to a parent stream. It is however, a principle source of groundwater to the Rathdrum Aquifer. Hillslopes are generally steep (40 to 60 percent) and vegetated predominately with conifers. Management activities such as timber harvest and road building has occurred in most of the tributaries to varying degrees. Much of the lower watershed and lake shore include or are adjacent to private land. Activities that have occurred on this urban interface include timber harvest, road building, cattle grazing, agriculture, residential development, and water-based recreation.

The watershed system is considered to be functioning at risk, although it includes some tributaries that may be considered either properly functioning or not properly functioning subwatersheds. This status is the result of the relative sensitivity of the watershed system (its soils and landtypes, and the predominance of sensitive snowpacks), and from its history of development. This means that watershed and aquatic integrity are still high, but at risk from continued disturbances. As described above, watersheds that are functioning at risk are considered the highest priority for watershed restoration and improvement.

Within Hayden Lake Watershed, a total of 13 miles of road has had watershed improvement work recently completed. Work included removal of 24 road channel crossings, stabilizing unstable road sections, increasing culverts sizes to reduce failure potential and provide fish passage, and erosion control. Along with the completed road work, stream stabilization and fisheries improvement work has been completed in the North Fork of Hayden Creek.

Streamflow Regime

The hydrology of the Hayden Lake Watershed and all its major tributaries has been altered by past timber harvest and road building, in four respects. First, it can be inferred, from the peak flow increases, that periods of spring peak flow are longer in duration (Troendle and King, 1983). The timing of runoff from increased water yields is dependent upon air and snowpack temperature and exposure to solar radiation, which are controlled by elevation, aspect, slope, and shading from topography and/or vegetation.

Second, data from the Idaho Panhandle National Forests and several studies (Kappesser,1991. Christner and Harr, 1982. Harr, 1981) suggest that peak flows generated by rain-on-snow events can increase substantially when the forest canopy is removed by harvest or natural disturbance. Approximately 45% of the Hayden Lake watershed is sensitive to rain-on-snow events.

Third, the effective gradient of some of the channels has been increased. This is evident in the headwater channels that have had large woody debris (pool creators) removed during timber harvest, and in the main Hayden Creek channels and several of the smaller tributaries that have been straightened by road placement. The effects of peak flows of longer duration, peak flows of increased magnitude, and increased channel gradients is increased stream power. Increases in stream power results in increased probability to create and transport sediment. Increases in monthly peak flows are elevated above natural conditions due to past timber harvest activities and road building. The equivalent clearcut area in the Hayden Lake watershed is approximately 3%.

Fourth, subsurface flows intercepted by road cuts can be rapidly routed by compacted road surfaces and ditches to stream channels causing an increase in the total runoff. This is a special concern when roads are located low in the watershed and where roads traverse clearcuts. Megahan (1983) noted that the volume of water intercepted by road cuts below clearcuts that have been burned, increased by 96 percent.

Stream Channel Stability

Roads which encroach into stream channels or flood-prone areas are common in Hayden Creek, several of it's tributaries, and in Jim Creek (a tributary to Hayden Lake). Encroaching roads constrict the stream, particularly during high flows, forcing large volumes of water through a smaller channel with great erosive force. Road and culvert failures along with channel pattern changes can result in undesirable long-term changes to the stream. Streamside roads are subject to frequent or continual stress of flow against the roadfill, particularly during peak discharges. These roads manifest frequent and often large failures and can be a chronic source of sediment to the stream. Frequent road failures have caused excess sediment introduction through the years, including the February 1996 flood event within the North Fork of Hayden Creek and Jim Creek. During the 1996 flood event, a section of Road 625 and the channel crossing at Bradbury Gulch failed, introducing a substantial volume of roadfill into the North Fork of Hayden Creek, an important fisheries stream. In the past other such failures have occurred. Of all the encroaching roads within the Hayden Lake Watershed, this would be the highest priority for removal. Overall within the Hayden Lake Watershed, those sections of road that directly compromise stream hydraulics, are estimated to be .03 miles/total miles of stream length, with a total of 13.8 miles of riparian road. Along this 13.8 miles of riparian roading, an estimated 5 miles of riparian road reduces stream shading to the extent that local water temperatures may be affected. Ten drainage structures were determined to be fish migration barriers along the 13.8 miles of riparian roads within the Hayden Lake Watershed.

Increased bedload supply and bed mobility can result from riparian harvest and may result in increases in streambank erosion. Toews and Moore (1982) report streambank erosion was more than 250 percent greater after logging than before in clearcut areas where no buffers strips were left. Within the Hayden Lake Watershed, 18 percent of the linear riparian influenced area has been directly affected by past harvest. This represents a relatively moderate amount of past riparian harvest within the watershed.

Water Quality

Approximately 288 miles of road and 186 road channel crossings exist in the Hayden Lake Watershed, with road densities of 5.67 miles/square mile of area. The stream crossing frequency throughout the watershed is approximately 1.62 stream crossings/mile of road. Each of the road channel crossings, particularly on roads which are no longer maintained, have the potential to plug and subsequently fail. Fills at channel crossings without plugged culverts, may also fail because of exceptionally steep slopes and/or unstable soils. Within the watershed, 19 percent of the watershed is on sensitive landtypes with high landslide and sediment delivery potential, with approximately 21 percent of the miles of road on these same sensitive land types. In addition, sediment has been released from headwater areas through harvest of riparian influenced areas and the "removing" of channel debris. Of the road channel crossings inventoried, 2 have failed, 12 are failing, and 26 are at high risk for failing. The majority of these sites were located on unmaintained or irregularly maintained roads. These failures and the continual bank erosion and road fill failures of the streamside roads are the primary sediment contributors and component of disturbance to the lower to mid elevation areas of the watershed.

Table III-33. Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances in the Hayden Lake Watershed.

Physical Characteristics	
HUC: 1701030512	
Drainage Area (square miles)	65
Sensitive Landtypes (percent of watershed)	19
Sensitive Snowpack (percent of watershed)	45
Qualifications	
Is all or part listed as Water Quality Limited?	yes
Apparent Watershed Status	Functioning at Risk
Subwatersheds used for analysis	East Fork Hayden Creek, Mokins Creek, Jim Creek, Yellowbanks Creek, North Fork Hayden Creek
Hydrologic Regime	
Estimated Peak Flow (Q2 cfsm)	17
Current Runoff Modification (percent of peak)	2
Equivalent Clearcut Area (percent of watershed)	3
Erosion and Sediment	
Estimated Annual Sediment (tons/mile2/year)	14
Current Sediment Load Modification (percent)	164
Road Density (miles/mile2)	5.7
Sensitive Road Density (miles/mile2)	0.9
Channel Conflicts	
Road Encroaching at Bankfull Stage (miles)	3.5
Riparian Road Density (miles/mile2)	0.1
Stream Crossings	
Number of Inventoried Crossings	67
Risk of Failure for Inventoried Crossings (tons/year)	100
Number of Estimated Crossings	42
Risk of Failure for Estimated Crossings (tons/year)	269
Stream Crossing Frequency (#/mile of stream)	1.6
Number of Fish Migration Barriers	10

Table III-34. Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances in the Hayden Lake Watershed (Hayden Creek Above Lancaster).

Physical Characteristics	
HUC: 170103051201	
Drainage Area (square miles)	24.8
Sensitive Landtypes (percent of watershed)	21
Sensitive Snowpack (percent of watershed)	45
Qualifications	
Is all or part listed as Water Quality Limited?	Yes
Apparent Watershed Status	Functioning at Risk
Subwatersheds used for analysis	East Fork Hayden Creek, North Fork Hayden Creek
Hydrologic Regime	
Estimated Peak Flow (Q2 cfsm)	17
Current Runoff Modification (percent of peak)	5
Equivalent Clearcut Area (percent of watershed)	7
Erosion and Sediment	
Estimated Annual Sediment (tons/mile2/year)	15
Current Sediment Load Modification (percent)	172
Road Density (miles/mile2)	5.8
Sensitive Road Density (miles/mile2)	1.2
Channel Conflicts	
Road Encroaching at Bankfull Stage (miles)	1.9
Riparian Road Density (miles/mile2)	0.5
Stream Crossings	
Number of Inventoried Crossings	39
Risk of Failure for Inventoried Crossings (tons/year)	127
Number of Estimated Crossings	29
Risk of Failure for Estimated Crossings (tons/year)	83
Stream Crossing Frequency (#/mile of stream)	1.4
Number of Fish Migration Barriers	8

Coeur d'Alene Lake Analysis Area

Overview

The Coeur d'Alene Lake analysis area is approximately 157,000 acres and includes several major fourth and fifth-order streams. Watersheds on the west side of Fourth of July Pass drain into Lake Coeur d'Alene or Fernan Lake. Drainages on the east side of Fourth of July Pass drain eastward into the lower Coeur d'Alene River and the Chain Lakes area. Five sixth-code scale watersheds have been identified and analyzed for potential effects, including Fernan, Wolf Lodge, Beauty, Carlin, and Cedar Creeks. The large area of small, independent "face" drainages flowing into Coeur d'Alene Lake west of the pass have been grouped together and are identified as "Other Watersheds." Lands in the Coeur d'Alene Lake analysis area are mostly privately-owned.

Valley sideslopes throughout the entire area are generally steep (30 to 70 percent) and vegetated predominately with conifers. Activities such as timber harvest and road building has occurred throughout all the watersheds within the analysis area. Within this analysis area, Beauty Creek and Fernan Creek are identified as not properly functioning watersheds. The remaining watersheds within this area have been identified as functioning-at-risk watersheds and as previously described are a high priority for watershed improvement work.

Within the Coeur d'Alene Lake analysis area, a total of 46 miles of road has had watershed improvement work completed. Work included removal of 122 road channel crossings, stabilizing unstable road sections, increasing culvert sizes to reduce failure potential, and applying erosion control.

Streamflow Regime

The hydrologic regime within the majority of the watersheds has been altered as a result of timber harvest and road building, in the same four respects as previously discussed. Both monthly peak flows and the risk of rain-on-snow generated peak flows are presumed to be elevated from past management activities within the majority of the Coeur d'Alene Lake area.

Stream Channel Stability

Encroachment by streamside roads is the dominant feature of the riparian areas in Dry Creek, a tributary to Fernan, Beauty and Varnum Creeks. Within Beauty Creek, frequent road failures have caused excess sediment introduction through the years. Overall within the Coeur d'Alene Lake analysis area, encroaching road densities are estimated to be .01 mile per mile of stream length, with a total of 82 miles of riparian road. Along these 82 miles of riparian roading, an estimated 2.6 miles of inventoried riparian road reduces stream shading to the extent that local water temperatures may be affected. Eight fish migration barriers were identified during subwatershed surveys.

Water Quality

Approximately 560 miles of road and 530 road channel crossings exist in the Coeur d'Alene Lake analysis area, with road densities of 4.8 mile/square mile of land in the entire analysis area. The stream-crossing frequency throughout the watershed is approximately 2.1 crossings per mile of stream. Each of the road channel crossings, particularly on roads which are no longer maintained, have the potential to plug and subsequently fail. Fills at channel crossings without plugged culverts, may also fail because of exceptionally steep slopes and/or unstable soils. Within the Coeur d'Alene Lake analysis area, 22 percent of the area is on sensitive landtypes with high landslide and sediment delivery potential, with approximately 12 percent of the miles of road on these same land types. In addition, sediment has been released from headwater areas through harvest of riparian influenced areas and the "cleaning" of channel debris.

Table III-35. Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances in the Coeur d' Alene Lake Watershed (Fernan Creek Tributary).

Physical Characteristics	
HUC: 170103031301	
Drainage Area (square miles)	18.8
Sensitive Landtypes (percent of watershed)	22
Sensitive Snowpack (percent of watershed)	43
Qualifications	
Is all or part listed as Water Quality Limited?	yes
Apparent Watershed Status	Not Properly Functioning
Subwatersheds used for analysis	Entire watershed
Hydrologic Regime	
Estimated Peak Flow (Q2 cfsm)	17
Current Runoff Modification (percent of peak)	10
Equivalent Clearcut Area (percent of watershed)	6
Erosion and Sediment	
Estimated Annual Sediment (tons/mile2/year)	20
Current Sediment Load Modification (percent)	167
Road Density (miles/mile2)	5.2
Sensitive Road Density (miles/mile2)	0.9
Channel Conflicts	
Road Encroaching at Bankfull Stage (miles)	0.8
Riparian Road Density (miles/mile2)	0.4
Stream Crossings	
Number of Inventoried Crossings	25
Risk of Failure for Inventoried Crossings (tons/year)	137
Number of Estimated Crossings	43
Risk of Failure for Estimated Crossings (tons/year)	79
Stream Crossing Frequency (#/mile of stream)	2.0
Number of Fish Migration Barriers	2

Table III-36. Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances in the Coeur d'Alene Lake Watershed (Wolf Lodge Creek Tributary).

Physical Characteristics	
HUC: 1701030306	
Drainage Area (square miles)	35
Sensitive Landtypes (percent of watershed)	29
Sensitive Snowpack (percent of watershed)	61
Qualifications	
Is all or part listed as Water Quality Limited?	yes
Apparent Watershed Status	Functioning at Risk
Subwatersheds used for analysis	Marie Creek, Stella Creek, Wolf Lodge below Marie Creek
Hydrologic Regime	
Estimated Peak Flow (Q2 cfsm)	26
Current Runoff Modification (percent of peak)	4
Equivalent Clearcut Area (percent of watershed)	8
Erosion and Sediment	
Estimated Annual Sediment (tons/mile2/year)	15
Current Sediment Load Modification (percent)	81
Road Density (miles/mile2)	4.7
Sensitive Road Density (miles/mile2)	0.7
Channel Conflicts	
Road Encroaching at Bankfull Stage (miles)	0.8
Riparian Road Density (miles/mile2)	0.4
Stream Crossings	
Number of Inventoried Crossings	37
Risk of Failure for Inventoried Crossings (tons/year)	9
Number of Estimated Crossings	36
Risk of Failure for Estimated Crossings (tons/year)	87
Stream Crossing Frequency (#/mile of stream)	2.0
Number of Fish Migration Barriers	2

Table III-37. Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances in the Coeur d' Alene Lake Watershed (Marie Creek Tributary).

Physical Characteristics	
HUC: 170103030602	
Drainage Area (square miles)	18
Sensitive Landtypes (percent of watershed)	28
Sensitive Snowpack (percent of watershed)	n/a
Qualifications	
Is all or part listed as Water Quality Limited?	yes
Apparent Watershed Status	Functioning at Risk
Subwatersheds used for analysis	Entire watershed
Hydrologic Regime	
Estimated Peak Flow (Q2 cfsm)	n/a
Current Runoff Modification (percent of peak)	5
Equivalent Clearcut Area (percent of watershed)	7
Erosion and Sediment	
Estimated Annual Sediment (tons/mile2/year)	18
Current Sediment Load Modification (percent)	75
Road Density (miles/mile2)	4.9
Sensitive Road Density (miles/mile2)	0.6
Channel Conflicts	
Road Encroaching at Bankfull Stage (miles)	n/a
Riparian Road Density (miles/mile2)	n/a
Stream Crossings	
Number of Inventoried Crossings	14
Risk of Failure for Inventoried Crossings (tons/year)	36
Number of Estimated Crossings	9
Risk of Failure for Estimated Crossings (tons/year)	14
Stream Crossing Frequency (#/mile of stream)	0.7
Number of Fish Migration Barriers	1

Table III-38. Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances in the Coeur d' Alene Lake Watershed (Stella Creek Tributary).

Physical Characteristics	
HUC: 170103030602	
Drainage Area (square miles)	18
Sensitive Landtypes (percent of watershed)	28
Sensitive Snowpack (percent of watershed)	n/a
Qualifications	
Is all or part listed as Water Quality Limited?	yes
Apparent Watershed Status	Functioning at Risk
Subwatersheds used for analysis	Entire watershed
Hydrologic Regime	
Estimated Peak Flow (Q2 cfsm)	n/a
Current Runoff Modification (percent of peak)	5
Equivalent Clearcut Area (percent of watershed)	7
Erosion and Sediment	
Estimated Annual Sediment (tons/mile2/year)	18
Current Sediment Load Modification (percent)	75
Road Density (miles/mile2)	4.9
Sensitive Road Density (miles/mile2)	0.6
Channel Conflicts	
Road Encroaching at Bankfull Stage (miles)	n/a
Riparian Road Density (miles/mile2)	n/a
Stream Crossings	
Number of Inventoried Crossings	14
Risk of Failure for Inventoried Crossings (tons/year)	28
Number of Estimated Crossings	21
Risk of Failure for Estimated Crossings (tons/year)	65
Stream Crossing Frequency (#/mile of stream)	0.7
Number of Fish Migration Barriers	1

Table III-39. Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances in the Coeur d'Alene Lake Watershed (Beauty Creek Tributary)

Physical Characteristics	
HUC: 1701030309	
Drainage Area (square miles)	11
Sensitive Landtypes (percent of watershed)	14
Sensitive Snowpack (percent of watershed)	78
Qualifications	
Is all or part listed as Water Quality Limited?	No
Apparent Watershed Status	Not Properly Functioning
Subwatersheds used for analysis	Entire watershed
Hydrologic Regime	
Estimated Peak Flow (Q2 cfsm)	23
Current Runoff Modification (percent of peak)	5
Equivalent Clearcut Area (percent of watershed)	7
Erosion and Sediment	
Estimated Annual Sediment (tons/mile2/year)	16
Current Sediment Load Modification (percent)	130
Road Density (miles/mile2)	4.5
Sensitive Road Density (miles/mile2)	0.6
Channel Conflicts	
Road Encroaching at Bankfull Stage (miles)	1.4
Riparian Road Density (miles/mile2)	0.3
Stream Crossings	
Number of Inventoried Crossings	22
Risk of Failure for Inventoried Crossings (tons/year)	84
Number of Estimated Crossings	32
Risk of Failure for Estimated Crossings (tons/year)	87
Stream Crossing Frequency (#/mile of stream)	2.6
Number of Fish Migration Barriers	2

Table III-40. Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances in the Coeur d'Alene Lake Watershed (Carlin Creek Tributary).

Physical Characteristics	
HUC: 170103035001	
Drainage Area (square miles)	11.9
Sensitive Landtypes (percent of watershed)	17
Sensitive Snowpack (percent of watershed)	45
Qualifications	
Is all or part listed as Water Quality Limited?	Yes
Apparent Watershed Status	Functioning at Risk
Subwatersheds used for analysis	Entire watershed
Hydrologic Regime	
Estimated Peak Flow (Q2 cfsm)	18
Current Runoff Modification (percent of peak)	6
Equivalent Clearcut Area (percent of watershed)	3
Erosion and Sediment	
Estimated Annual Sediment (tons/mile2/year)	26
Current Sediment Load Modification (percent)	95
Road Density (miles/mile2)	5.2
Sensitive Road Density (miles/mile2)	0.3
Channel Conflicts	
Road Encroaching at Bankfull Stage (miles)	0
Riparian Road Density (miles/mile2)	0.2
Stream Crossings	
Number of Inventoried Crossings	15
Risk of Failure for Inventoried Crossings (tons/year)	104
Number of Estimated Crossings	7
Risk of Failure for Estimated Crossings (tons/year)	40
Stream Crossing Frequency (#/mile of stream)	1.3
Number of Fish Migration Barriers	0

Table III-41. Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances in the Coeur d'Alene Lake Watershed (Cedar Creek Tributary)

Physical Characteristics	
HUC: 170103030609	
Drainage Area (square miles)	15
Sensitive Landtypes (percent of watershed)	12
Sensitive Snowpack (percent of watershed)	74
Qualifications	
Is all or part listed as Water Quality Limited?	Yes
Apparent Watershed Status	Functioning at Risk
Subwatersheds used for analysis	Entire watershed
Hydrologic Regime	
Estimated Peak Flow (Q2 cfsm)	28
Current Runoff Modification (percent of peak)	7
Equivalent Clearcut Area (percent of watershed)	10
Erosion and Sediment	
Estimated Annual Sediment (tons/mile2/year)	15
Current Sediment Load Modification (percent)	141
Road Density (miles/mile2)	4.2
Sensitive Road Density (miles/mile2)	0.8
Channel Conflicts	
Road Encroaching at Bankfull Stage (miles)	0.02
Riparian Road Density (miles/mile2)	0.3
Stream Crossings	
Number of Inventoried Crossings	20
Risk of Failure for Inventoried Crossings (tons/year)	25
Number of Estimated Crossings	0
Risk of Failure for Estimated Crossings (tons/year)	0
Stream Crossing Frequency (#/mile of stream)	1.9
Number of Fish Migration Barriers	0

Table III-42. Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances in the Coeur d'Alene Lake Watershed (Fourth of July Creek Tributary).

Physical Characteristics	
HUC: 170103030401	
Drainage Area (square miles)	16.7
Sensitive Landtypes (percent of watershed)	26
Sensitive Snowpack (percent of watershed)	61
Qualifications	
Is all or part listed as Water Quality Limited?	Yes
Apparent Watershed Status	Not Properly Functioning
Subwatersheds used for analysis	Entire watershed
Hydrologic Regime	
Estimated Peak Flow (Q2 cfsm)	n/a
Current Runoff Modification (percent of peak)	5
Equivalent Clearcut Area (percent of watershed)	6
Erosion and Sediment	
Estimated Annual Sediment (tons/mile2/year)	18
Current Sediment Load Modification (percent)	156
Road Density (miles/mile2)	6.0
Sensitive Road Density (miles/mile2)	1.4
Channel Conflicts	
Road Encroaching at Bankfull Stage (miles)	2.1
Riparian Road Density (miles/mile2)	0.5
Stream Crossings	
Number of Inventoried Crossings	17
Risk of Failure for Inventoried Crossings (tons/year)	78
Number of Estimated Crossings	17
Risk of Failure for Estimated Crossings (tons/year)	31
Stream Crossing Frequency (#/mile of stream)	1.5
Number of Fish Migration Barriers	0

Chain Lakes Analysis Area

Overview

The Chain Lakes analysis area is approximately 56,227 acres that includes a series of third, fourth and fifth order streams that flow into private land and into either the Chain Lakes or the South Fork of the Coeur d'Alene River. Private land borders the entire south and west side of this analysis area. Valley sideslopes throughout the entire area are generally steep (40 to 70 percent) and vegetated predominately with conifers. Activities such as timber harvest and road building have occurred throughout the majority of the watersheds within the analysis area. Within this analysis area, Rose Creek is identified as a properly functioning watershed. This means that the watershed is essentially in good condition, where the streams are in dynamic equilibrium within their watersheds. The remaining watersheds within this area have been identified as functioning-at-risk watersheds and as previously described are a high priority for watershed improvement work.

Within the Chain Lakes analysis area, a total of 34 miles of road have had watershed improvement work completed. Work included removal of 66 road channel crossings, stabilizing unstable road sections, increasing culvert sizes to reduce failure potential and applying erosion control.

Streamflow Regime

The hydrologic regime within the majority of the watershed has been altered as a result of timber harvest and road building, in the same four respects as previously discussed. Both monthly peak flows and the risk of rain-on-snow generated peak flows are presumed to be elevated from past management activities within the majority of the Chain Lakes area. Approximately 58% of the Chain Lakes watershed is sensitive to rain-on-snow events. ECA's within the Chain of Lakes area are estimated at 6%.

Stream Channel Stability

Encroachment by streamside roads is the dominant feature of the riparian areas in Cottonwood Creek and the West Fork of Fortier Creek. Frequent road failures have caused excess sediment introduction through the years. Overall within the Chain Lakes Area, encroaching road densities are estimated to be 0.01 miles per mile of riparian area, with a total of 53 miles of riparian road. Within this riparian roading, an estimated 1.03 miles of inventoried riparian road reduces stream shading to the extent that local water temperatures may be affected. Four fish migration barriers are known to exist within the Chain Lakes area.

Within the major watersheds in the Chain Lakes area, a relatively low amount (less than 2 percent) of the riparian-influenced area has been directly affected by past harvest.

Water Quality

Approximately 163 miles of road and 204 road channel crossings exist in the Chain Lakes Area, with road densities of 4.77 miles/square mile. The stream-crossing frequency throughout the watershed is approximately 2.5 crossings per mile of stream. As previously discussed, each of the road channel crossings, particularly on roads which are no longer maintained, have the potential to plug and subsequently fail. Within the Chain Lakes analysis area, 23 percent of the watershed is on sensitive landtypes with high landslide and sediment delivery potential, with approximately 29 percent of the miles of roads on these sensitive land types. In addition, sediment has been released from headwater areas through harvest of riparian influenced areas and the "cleaning" of channel debris.

Table III-43. Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances in the Chain Lakes Area Watershed.

Physical Characteristics	
HUC: 1701030140	
Drainage Area (square miles)	87.9
Sensitive Landtypes (percent of watershed)	23
Sensitive Snowpack (percent of watershed)	58
Qualifications	
Is all or part listed as Water Quality Limited?	No
Apparent Watershed Status	n/a
Subwatersheds used for analysis	Fortier Creek, Blue Lake Creek, Thompson Creek, Cottonwood Creek, Rose Creek
Hydrologic Regime	
Estimated Peak Flow (Q2 cfsm)	n/a
Current Runoff Modification (percent of peak)	4
Equivalent Clearcut Area (percent of watershed)	6
Erosion and Sediment	
Estimated Annual Sediment (tons/mile2/year)	19
Current Sediment Load Modification (percent)	180
Road Density (miles/mile2)	4.8
Sensitive Road Density (miles/mile2)	1.4
Channel Conflicts	
Road Encroaching at Bankfull Stage (miles)	1.7
Riparian Road Density (miles/mile2)	0.6
Stream Crossings	
Number of Inventoried Crossings	34
Risk of Failure for Inventoried Crossings (tons/year)	62
Number of Estimated Crossings	85
Risk of Failure for Estimated Crossings (tons/year)	353
Stream Crossing Frequency (#/mile of stream)	2.5
Number of Fish Migration Barriers	4

Steamboat Analysis Area

Overview

Steamboat Creek is a 26,780 acre fifth-order watershed that flows into the North Fork of the Coeur d'Alene River. Valley sideslopes are generally steep (50 to 70 percent) and vegetated predominately with conifers. Activities such as timber harvest and road building have occurred throughout the watershed. This watershed is identified as functioning at risk. As previously described, these types of watersheds are a high priority for watershed improvement work.

Within the Steamboat analysis area, a total of 80 miles of road has had watershed improvement work completed. Work included removal of 108 road channel crossings, removal of 3 miles of encroaching streamside roading, stabilizing unstable road sections, increasing culverts sizes to reduce failure potential, and applying erosion control.

Streamflow Regime

The hydrologic regime within Steamboat Creek has been altered as a result of timber harvest and road building, in same four respects as previously discussed. Both monthly peak flows and the risk of rain-on-snow generated peak flows are elevated from past management activities. Approximately 72% of the Steamboat watershed is sensitive to rain-on-snow events. ECA's are approximately 10% of the watershed.

Stream Channel Stability

Encroachment by streamside roads is the dominant feature of the riparian areas in the Main, West, and East Forks of Steamboat Creek, as well as in Omaha, June, and Can Creeks. Road failures have caused excess sediment introduction through the years, including the February 1996 flood event. Overall within Steamboat Creek, encroaching road densities are estimated to be 0.07 mile per mile of riparian area, with a total of 18 miles of riparian road. Within this riparian roading, an estimated 7.5 miles of riparian road reduces stream shading to the extent that local water temperatures may be affected. Two fish migration barriers are known to exist along the main stem of Steamboat Creek.

Within the Steamboat analysis area, a relatively high amount (49 percent) of the riparian-influenced area has been directly affected by past harvest.

Water Quality

Approximately 360 miles of road and 402 road channel crossings exist in the Steamboat analysis area, with road densities of 8.61 miles of road per square mile of land area. The stream-crossing frequency throughout the watershed is approximately 3.7 channel crossings per mile of stream. Each of the road channel crossings, particularly on roads which are no longer maintained, have the potential to plug and subsequently fail. Within the Steamboat analysis area, 25 percent of the watershed is on sensitive landtypes with high landslide and sediment delivery potential, with approximately 24 percent of the miles of road on these sensitive land types.

Table III-44. Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances in the Steamboat Creek Watershed.

Physical Characteristics	
HUC: 1701030109	
Drainage Area (square miles)	41.8
Sensitive Landtypes (percent of watershed)	25
Sensitive Snowpack (percent of watershed)	72
Qualifications	
Is all or part listed as Water Quality Limited?	Yes
Apparent Watershed Status	Functioning at Risk
Subwatersheds used for analysis	Entire watershed
Hydrologic Regime	
Estimated Peak Flow (Q2 cfsm)	22
Current Runoff Modification (percent of peak)	8
Equivalent Clearcut Area (percent of watershed)	10
Erosion and Sediment	
Estimated Annual Sediment (tons/mile2/year)	14
Current Sediment Load Modification (percent)	202
Road Density (miles/mile2)	8.6
Sensitive Road Density (miles/mile2)	2.1
Channel Conflicts	
Road Encroaching at Bankfull Stage (miles)	7.5
Riparian Road Density (miles/mile2)	1.07
Stream Crossings	
Number of Inventoried Crossings	28
Risk of Failure for Inventoried Crossings (tons/year)	111
Number of Estimated Crossings	6
Risk of Failure for Estimated Crossings (tons/year)	12
Stream Crossing Frequency (#/mile of stream)	3.7
Number of Fish Migration Barriers	2

Bumblebee Analysis Area

Overview

Bumblebee Area is a 14,124-acre area that includes Bumblebee Creek, a fifth-order watershed that flows into the Little North Fork of the Coeur d'Alene River three miles above the Main North Fork of the Coeur d'Alene River. Scattered parcels of private land, mostly adjacent to the Little North Fork are present, but there are few houses. Valley sideslopes throughout the entire area are generally steep (40 to 70 percent) and vegetated predominately with conifers. Activities such as timber harvest and road building have occurred throughout the watershed. Bumblebee watershed is identified as not properly functioning.

Within the Bumblebee analysis area, a total of 25 miles of road has had watershed improvement work completed. Work included removal of 40 road channel crossings, stabilizing unstable road sections, and applying erosion control.

Streamflow Regime

The hydrologic regime within Bumblebee Creek and face drainages of the Little North Fork of the Coeur d'Alene River have been altered as a result of timber harvest and road building, in same four respects as previously discussed. Both monthly peak flows and the risk of rain-on-snow generated peak flows are presumed to be elevated from past management activities within the majority of the Bumblebee area. ECA's with the Bumblebee area are estimated to be 12%.

Stream Channel Stability

Encroachment by streamside roads is the dominant feature of the riparian area in Bumblebee Creek. Road failures have caused excess sediment introduction through the years. Overall within the Bumblebee Area, encroaching road densities are estimated to be 0.02 miles per mile of riparian area, with a total of 6.5 miles of riparian road. Within this riparian roading, an estimated 2.4 miles of riparian road reduces stream shading to the extent that local water temperatures may be affected. No fish migration barriers are known to exist within the Bumblebee area.

Within the Bumblebee analysis area, a relatively high amount (48 percent) of the riparian-influenced area has been directly affected by past harvest.

Water Quality

Approximately 137 miles of road and 84 road channel crossings exist in the Bumblebee analysis area, with road densities of 6.23 miles per square mile of land. The stream-crossing frequency throughout the watershed is approximately 1.3 crossings per mile of stream. Each of the road channel crossings, particularly on roads which are no longer maintained, have the potential to plug and subsequently fail. Within the Bumblebee analysis area, 42 percent of the watershed is on sensitive landtypes with high landslide and sediment delivery potential, with approximately 43 percent of the miles of roads are on these sensitive land types. Road channel crossing failures and the continual bank erosion and road fill failures of the streamside road are the primary sediment contributors and component of disturbance to the lower to mid elevation areas of the watersheds.

Table III-45. Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances in the Bumblebee Creek Watershed Area.

Physical Characteristics	
HUC: 170103030101	
Drainage Area (square miles)	22.0
Sensitive Landtypes (percent of watershed)	42
Sensitive Snowpack (percent of watershed)	53
Qualifications	
Is all or part listed as Water Quality Limited?	Yes
Apparent Watershed Status	Not properly functioning
Subwatersheds used for analysis	Face drainages to the Little NF CDA River
Hydrologic Regime	
Estimated Peak Flow (Q2 cfsm)	25
Current Runoff Modification (percent of peak)	9
Equivalent Clearcut Area (percent of watershed)	12
Erosion and Sediment	
Estimated Annual Sediment (tons/mile2/year)	20
Current Sediment Load Modification (percent)	273
Road Density (miles/mile2)	6.2
Sensitive Road Density (miles/mile2)	2.7
Channel Conflicts	
Road Encroaching at Bankfull Stage (miles)	2.6
Riparian Road Density (miles/mile2)	0.1
Stream Crossings	
Number of Inventoried Crossings	4
Risk of Failure for Inventoried Crossings (tons/year)	26
Number of Estimated Crossings	15
Risk of Failure for Estimated Crossings (tons/year)	12
Stream Crossing Frequency (#/mile of stream)	1.3
Number of Fish Migration Barriers	0

Hart Analysis Area

For analysis purposes, the Hart area has been addressed by two sets of watersheds: Hart Creek and Beaver Creek.

Hart Creek Watersheds

Overview

The Hart area is a 16,440-acre area that drains into the North Fork of the Coeur 'Alene River. This area includes major drainages such as Brown, Hart, Hopkins and Rookie Creeks, with numerous face drainages to the Coeur d'Alene River. Private land is located adjacent to the Coeur d'Alene River, with both year-round and seasonal residences. Valley sideslopes are generally steep (45 to 70 percent) and vegetated predominately with conifers. Activities such as timber harvest and road building have occurred throughout a small percentage of this area. The area east of Browns Creek has had very little timber harvest and road building. Within the Hart analysis area , Browns Creek and it's tributaries, including some of the face drainages, are identified as non-functioning, a low priority for watershed improvement work. The remaining watersheds in the Hart area are identified as properly functioning.

Streamflow Regime

The hydrologic regime within the Hart Area has been altered as a result of timber harvest and road building in Browns Creek and some of the face drainages in the same four respects as previously discussed. Both monthly peak flows and the risk of rain-on-snow generated peak flows are presumed to be elevated from past management activities within Browns Creek section of the Hart area. ECA's within the Hart area are estimated to be 5%.

Stream Channel Stability

Encroachment by streamside roads is the dominant feature of the riparian areas in Browns Creek and Hopkins Creek. Overall within the Hart area, encroaching road densities are estimated to be .01 mile per mile of riparian area, with a total of 20 miles of riparian road. Within this riparian roading, an estimated 1.1 miles of riparian road reduces stream shading to the extent that local water temperatures may be affected.

Within the watersheds in the Hart Creek watersheds, a relatively low amount (4 percent) of the riparian-influenced area has been directly affected by past harvest.

Water Quality

Approximately 126 miles of road and 96 road channel crossings exist in the watersheds in the Hart Area, with road densities of 4.9 miles per square mile. The stream crossing frequency throughout the watersheds is approximately 1.12 crossings per mile of stream. Within the Hart Creek watersheds, 38 percent is on sensitive landtypes with high landslide and sediment delivery potential, with approximately 34 percent of the miles of road on these sensitive land types.

Table III-46. Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances in the Hart Area Watershed.

Physical Characteristics	
HUC: 171030301	
Drainage Area (square miles)	25.7
Sensitive Landtypes (percent of watershed)	38
Sensitive Snowpack (percent of watershed)	57
Qualifications	
Is all or part listed as Water Quality Limited?	n/a
Apparent Watershed Status	n/a
Subwatersheds used for analysis	n/a
Hydrologic Regime	
Estimated Peak Flow (Q2 cfsm)	n/a
Current Runoff Modification (percent of peak)	2
Equivalent Clearcut Area (percent of watershed)	5
Erosion and Sediment	
Estimated Annual Sediment (tons/mile2/year)	18
Current Sediment Load Modification (percent)	109
Road Density (miles/mile2)	4.9
Sensitive Road Density (miles/mile2)	1.7
Channel Conflicts	
Road Encroaching at Bankfull Stage (miles)	0.5
Riparian Road Density (miles/mile2)	0.23
Stream Crossings	
Number of Inventoried Crossings	3
Risk of Failure for Inventoried Crossings (tons/year)	4
Number of Estimated Crossings	12
Risk of Failure for Estimated Crossings (tons/year)	41
Stream Crossing Frequency (#/mile of stream)	1.1
Number of Fish Migration Barriers	2

Beaver Creek Watersheds

Overview

Beaver Creek is a 28183-acre fifth-order watershed that flows into the North Fork of the Coeur d'Alene River. Valley sideslopes are generally steep (50 to 70 percent) and vegetated predominately with conifers. Activities such as timber harvest, mining and road building has occurred throughout the watershed. This watershed is identified as not properly functioning. As previously described, these watersheds are a low priority for watershed improvement work.

Streamflow Regime

The hydrologic regime within Beaver Creek has been substantially altered as a result of timber harvest, road building, and mining in the same four respects as previously discussed. Both monthly peak flows and the risk of rain-on-snow generated peak flows are presumed to be elevated from past management activities. Approximately 70% of the Beaver Creek watershed is sensitive to rain-on-snow events. ECA's are approximately 9% of the watershed.

Stream Channel Stability

Encroachment by streamside roads is the dominant feature of the riparian areas in the majority of major tributaries and face drainages due to extensive mining that has occurred in the past and is ongoing. Road failures have caused excess sediment introduction through the years, including during the February 1996 flood event. Overall within Beaver Creek, encroaching road densities are estimated to be 0.02 miles per mile of riparian area, with a total of 37 miles of riparian road. Within this riparian roading, an estimate 1.20 miles of riparian road reduces stream shading to the extent that local water temperatures may be affected.

Within the Beaver Creek watershed, a relatively moderate amount (17 percent) of the riparian-influenced area has been directly affected by past harvest.

Water Quality

Approximately 223 miles of road and 203 road channel crossings exist in the Beaver Creek watersheds, with road densities of 5.07 miles per square mile of land. The stream-crossing frequency throughout the watershed is approximately 2.0 crossings per mile of stream. Each of the road channel crossings, particularly on roads which are no longer maintained, have the potential to plug and subsequently fail. Within the Beaver Creek Risk Area, 44 percent of the watershed is on sensitive landtypes with high landslide and sediment delivery potential, with approximately 35 percent of the miles of road on these sensitive land types. Road channel failures and the continual bank erosion and road fill failures of the streamside road are the primary sediment contributors and component of disturbance to the lower to mid-elevation areas of the watersheds.

Table III-47. Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances in the Beaver Creek Watershed.

Physical Characteristics	
HUC: 1701030130	
Drainage Area (square miles)	41.1
Sensitive Landtypes (percent of watershed)	44
Sensitive Snowpack (percent of watershed)	70
Qualifications	
Is all or part listed as Water Quality Limited?	Yes
Apparent Watershed Status	Not Properly Functioning
Subwatersheds used for analysis	Entire watershed
Hydrologic Regime	
Estimated Peak Flow (Q2 cfsm)	25
Current Runoff Modification (percent of peak)	1
Equivalent Clearcut Area (percent of watershed)	9
Erosion and Sediment	
Estimated Annual Sediment (tons/mile2/year)	17
Current Sediment Load Modification (percent)	136
Road Density (miles/mile2)	5.1
Sensitive Road Density (miles/mile2)	1.8
Channel Conflicts	
Road Encroaching at Bankfull Stage (miles)	2.9
Riparian Road Density (miles/mile2)	0.4
Stream Crossings	
Number of Inventoried Crossings	26
Risk of Failure for Inventoried Crossings (tons/year)	110
Number of Estimated Crossings	24
Risk of Failure for Estimated Crossings (tons/year)	42
Stream Crossing Frequency (#/mile of stream)	2.0
Number of Fish Migration Barriers	3

ENVIRONMENTAL CONSEQUENCES

Introduction

As stated earlier in the Affected Environment portion of this section, each of the project areas assessed were analyzed on at least two scales: the local site or tributaries where activities occur and the cumulative effect watershed. The cumulative effect watershed (or watershed area) is the logical culmination point of water flow where the effects of the distributed project activities could possibly integrate or synchronize over time and space and be addressed cumulatively in a larger watershed.

Effects Common to Alternatives

There are several common, or typical effects, that would occur with any action alternative and are discussed below. Many of these effects are related to the watershed restoration activities such as removal of encroaching roads. In the discussion, the effects of not removing the encroaching road (or other action) also is discussed.

Effects of Removal of Encroaching Roads

Effect on stream condition: Encroaching roads occupy the active flood prone area associated with the stream, or the active channel itself with road fill. Those road sections reduce capacity of the stream at flood stages, alter flow patterns, increase local velocities, redistribute sediment loads, and compromise the function of the stream's riparian areas. During flood flows, the depth of flow is increased, and normal flow patterns are disrupted. This often causes scouring of opposing stream banks and undercuts opposing hillslopes, which in turn is an erosion source that increases sediment input into the stream. Sometimes the scour undercuts the opposing slope which destabilizes it and initiates a mass failure (such as a slump or debris avalanche) of material into the stream. In some cases, the road constricts the channel enough that the natural meanders are straightened and stream slope is steepened. This can result in rapid adjustments by the stream to regain its balance with the water flow and sediment load. The result is an unstable stream which will compromise the support of beneficial uses.

Effect on sediment: Roads located close to streams usually deliver more sediment to streams than other roads for two reasons: 1) roads in close proximity to streams are more likely to be subject to the erosive forces of running water; and 2) eroded materials do not have to travel far to be delivered to the streams. The closer a road is to the stream, the smaller the expanse of forest floor and its rough materials available to capture and store sediment.

Road surface treatments, such as application of gravel would reduce sediment delivered to streams by reducing the amount of sediment eroded from the road surface.

Removal of encroaching roads would reduce sediment delivery in the short and long-term. Improvement in stream condition and habitat in terms of clarity, accumulation of sediment, loss of cover, erosive velocities, etc., would occur at the road removal site and immediately downstream.

During and after road removal, some fine sediment would likely be delivered to the water. The majority of sediment delivered to the stream would be in the form of suspended sediment. The suspended sediment would route through the stream system quickly and the primary effect would be turbidity (loss of clarity of the water). The increase in turbidity would be measurable for a short time immediately following disturbance and would be evident for short distances downstream from the fill removed (generally less than 1,000 feet). The amount of sediment from road fill removal would be low, especially when compared to the long-term reduction that would result. Standard Best Management Practices (including silt fences, mulch, and coffer structures to de-water the work site) as well as other erosion control techniques would minimize the amount of sediment delivered in the short-term. The re-establishment of effective vegetation would essentially eliminate long-term sediment inputs.

Tree Mortality and its Effect on Stream Temperature

At the tributary scale, stream temperature would not be expected to change in most watersheds under any alternative including the No-Action Alternative. No harvest would occur where shade or cover to the stream would be affected under any action alternative. Some trees that are currently providing shade to streams have already died or may die soon as a result of the Douglas-fir beetle attack. The loss of shade from this mortality would not be expected to increase water temperatures locally or downstream due to one or more of the following: high mixing capacity of most mountain streams, inflow of subsurface water, and/or the low amount mortality of shade trees in riparian areas.

Effects of Stream Crossing Failures on Abandoned or Unmaintained Roads

Extensive road networks were constructed in the 1960's throughout the analysis area. Typically these older roads were designed for a useful life of 20 years, including the crossing structures. The majority of these roads presently are stabilized with vegetation, and are not actively delivering sediment to stream channels. Although often brushed in, many of these roads still have culverts and fills at stream crossings. Abandoned and unmaintained roads, including stream crossings, can be expected to fail over time. These failures are usually associated with relatively infrequent hydrologic and climatic events. A typical example is when warm, moisture-laden air masses move into the region over a watershed that is dominated by a ripe snowpack (near freezing temperature and loaded with water), that is ready to melt. The results are often a rapid and flashy runoff that is referred to as a "rain-on-snow" flood. During these events, water flow can exceed the capacity of the crossing structure (such as a culvert pipe or bridge), or debris blocks the inlet. The water rises and overtops the fill, eroding it (often en masse), and depositing the material into the creek. In some locations, pore water pressure in the soil actually destabilizes the fill material and the hillslope, causing them to slump into the creek.

Effects of Sediment from Temporary Road Construction

Temporary roads are equivalent to system roads in that they are designed and planned as part of the transportation network. The difference between temporary and system roads is that a temporary road is intended to be restored to a hydrologically inert state after use. Slope stability would be restored, surface erosion would be eliminated, and all crossings and associated fill would be removed from the channel and floodplain and stabilized. The site should need no future maintenance after this restoration. The restoration of the site of a temporary road would be the responsibility of the timber sale purchaser before the end of the timber sale contract. Some timber sale contracts would last approximately five years.

Temporary roads would cause the same risk to water resources as any other road when they are in place. There would be some additional risk with temporary roads in that they are not designed to the same specifications as a system road. Locations, however, would either be specified or agreed upon between the timber sale purchaser and the timber sale administrator or engineer.

Effects of Stream Crossings

Stream crossing or pipe upgrades: Risk of stream crossings and culverts is a function of the chance of failure and the cost (or damage) associated with that failure. The design of the structure and the frequency of flood events determine the chance of failure. The cost of failure represents the amount of sediment eroded from the fill and delivered to the stream and the resulting response. The stream response can vary from turbidity, to deposition of sediment and loss of quality habitat, to entrainment of channel material, debris flows, and decreased channel stability. Either increasing the size of a culvert or the crossing structure or removing the drainage structure would reduce the chance that a fill may fail as a result of lack of capacity. Providing flow relief or overflow culverts or other structures in the event of excess streamflows or blockages also would reduce the chance of failure.

Armored bypass installation: Installation of armored bypass dips reduces the risk that the fill would enter the stream if a culvert plugs or flow exceeds its capacity. The armored dip is designed to allow water to flow over the road without eroding the fill. As with any construction or restoration activity, there is a chance that some incidental fine sediment would enter the stream in the short term. This incidental loading would be far overshadowed by the long-term and pronounced reduction of risk from the failure of the crossing.

Stream crossing maintenance or upgrade: Regular maintenance of stream crossings would reduce sediment delivery to streams. Additional cross drainage structures installed away from the live stream would capture sediment coming from the road surface and ditch and reroute it to the forest floor. This would not eliminate sediment delivery, but would reduce the amount currently delivered to the stream.

Effects of Installation of Relief Culvert Crossings

Installation of relief culverts would reduce the timing, magnitude and quantity of surface runoff because runoff from the ditch line would be dispersed and allowed to infiltrate into the forest floor. The dispersion of surface runoff would help "normalize" the flow regime of a basin by recharging the groundwater. The groundwater would slowly release into the live streams.

Effects of Increased Sediment due to Road Use

Use of roads during project activities would increase sediment delivered to streams. The heavy use of vehicles, mainly logging trucks, and frequent surface blading of the road surface would increase the amount of sediment eroded during summer rainfall events. Some of this sediment may be delivered to the stream where the road is near the stream or when runoff is carried down a ditch line. The amount of increased sediment would be expected to be immeasurable and would not reduce water quality or affect stream condition.

Effects of Stream Crossing Failures on Sustained Grade Roads

Stream crossings on steep sustained grades are sometimes inadvertently installed. At these crossings, the downhill approach of the road is lower than the road surface at the stream crossing. When the structure is blocked by debris or its capacity somehow is exceeded, the water overtops the pipe and begins flowing down the road. Instead of flowing directly over the road and back into the channel, it flows downslope on the road or in the ditch line until an obstruction, such as a low point in the road, forces the flow across the road surface and onto the fill. The water often erodes the road surface, causing gullies in the road tread, road fill, and the slope below the fill as the water travels back to the stream. The amount of sediment delivered to the stream from this type of erosion would exceed the amount of sediment delivered from only the stream crossing failure and would include erosion from the crossing, the ditch line, the road prism and the fill. In some cases, failure of a crossing and subsequent overflow can initiate mass failure of the hillslope above the failure.

Flow relief drivable and hardened dips can be installed at stream crossings where flows could escape as described down the road. This would reduce the amount of sediment delivered to the stream for the long term. Some sediment may be delivered to the stream during installation of the dips, but the amount would be small and not expected to reduce water quality or alter stream condition.

General Effects of Stream Crossing and/or Large Fill Failures

When large fills fail, such as at stream and draw crossings or at encroaching roads, they often inundate the stream with quantities of sediment that cannot easily be flushed through the stream. The deposited materials tend to remain intact as a mass or 'slug' of sediment that can severely alter smaller streams by filling both channel pools and flood prone areas. The result is a loss or inhibition of important channel elements and functions that are necessary to retain the dynamic equilibrium of the stream and to support beneficial uses of the water. As the sediment mass moves downstream and enters larger streams, the sediment begins to disperse, thereby reducing

the channel effects of the single failure. Multiple failures can combine and result in long-term adverse channel effects downstream.

General Localized/Site Scale Effects to Sediment Delivery

No sediment would be expected to be delivered to streams from logging yarding activities because of the implementation of Best Management Practices. Yarding activities also would be located beyond the riparian areas of streams or lakes. Undisturbed lands between all logging activities and Riparian Habitat Conservation Areas (RHCAs) would trap any sediment that may reach the margins of disturbed areas (Belt, G.H., et al)[1]. All landings would be located outside of RHCAs and designed to minimize the risk of sediment delivery and to prevent mass failure potential. These mitigation measures are included in Chapter II.

Protecting Desirable Stream Temperatures

Water temperature is the principal regulator of biological activities for aquatic organisms and often the limiting factor in their survival. Stream temperatures are a function of a variety of factors including some inherent to a stream and others which may be manipulated by management activities. The temperature of a stream is a function of the following variables: direct solar radiation, orientation of the channel, site topography, substrate color, groundwater contribution and dilution with other streams. Direct solar radiation is the main factor that can be altered by management activities. Research has documented that the single greatest means of increasing stream temperature is to remove that portion of the riparian vegetation that blocks direct solar radiation.

The proposed Douglas-fir beetle project activities would not impact existing stream temperatures. Field reviews suggest that the number of dead and dying riparian trees is very low and that these trees are scattered throughout stream basins. There would be no harvesting of riparian trees *except* when new stream crossings are constructed. When new roads approach streams, trees would be removed to allow for road construction There are very few stream crossings proposed in the Douglas-fir beetle project. This limited amount of streamside manipulation would not increase water temperature at the site nor would it be detected cumulatively downstream because there would be so little removal in any one basin.

Methodology

For purposes of comparing alternatives and analyzing the effects of each alternative, a table of watershed effects is presented. A table was developed for each analysis watershed. These effects include, but are not limited to, watershed restoration activities. The methods used in this section are the same as were used in the Affected Environment.

The table consists of measurement indicators and their units of measure, and the estimate of that parameter over the periods of time during and following the project for each alternative. The table is followed by a narrative discussion of direct, indirect, and cumulative effects in each watershed at the appropriate spatial and temporal scale. For a more detailed explanation of the indicators used, please refer to the "Watershed Hydrologic Response Estimates and WATSED" discussion in the "Affected Environment" section.

Sediment Yield Percent is the estimated annual sediment loading for the watershed and reported as the percent change above the estimated natural sediment yield for the watershed. The percent can be compared to the Current Sediment Load Modification listed in the tables in the Affected Environment section. Sediment yield percent is calculated for each alternative using the WATSED model. The proposed timber harvest units, construction and reconstruction of both system and temporary roads, and site preparation treatments are included in the analysis. The reasonably foreseeable actions which are included as Appendix E are also

[1] *Belt, G.H.; O'Lauglin, J.; Merril, T. 1992. Design of forest riparian buffer strips for the protection of water quality: analysis of scientific literature. Idaho Forest, Wildlife and Range Policy Analysis Group. Idaho Forest, Wildlife and Range Experiment Station, University Idaho. Report No. 8. June 1992.*

calculated in the analysis. It does not estimate the reduction in sediment from watershed restoration projects. The model was run for the period 1998-2008. The tables displays the conditions in the year 2006, which was used because the timber harvest and related activities would be completed by then, as described in the "Watershed Hydrologic Response Estimates and WATSED" discussion in the "Affected Environment" section.

Peak Flow represents the change in runoff, and is expressed for each watershed as a percent change from the estimated "natural" peak month discharge. The WATSED model also was used for this analysis to estimate the effects of the proposed timber harvest, road construction and reconstruction, and fuel treatment activities. Future actions are also included in the analysis. The peak flow can be compared to the existing peak flow displayed in the tables in the Affected Environment section.

Net Stream Crossings reflects the change in the number of stream crossings compared to the existing conditions as described in the "Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances." tables. These values can increase in an alternative due to new road construction or decrease in number due to watershed restoration actions. Reasonably foreseeable actions are included in the analysis. Stream crossings can cause sediment to be introduced into the stream, modify the stream flow, or cause migration barriers to fish movement.

Net Associated Risk displays the anticipated change in sediment risk associated with stream crossings which were inventoried within the scope of this project. The inventory did not include all stream crossings within each analysis area, and was focused on high-risk stream crossings. The associated risk is presented in terms of tons of sediment per year as discussed in the earlier tables displaying "Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances." This figure was calculated based on measurements or estimates of road fill located at stream crossings. Crossings that would be eliminated or upgraded would reduce net associated risk. This issue indicator is important in assessing watershed improvement work associated with the alternatives. The associated risk of the uninventoried stream crossings is not included in the reported value. The removal of these uninventoried stream crossings would further reduce the sediment risk.

Net Roads reflects the change in road mileage for a watershed. These values can increase in an alternative due to proposed or foreseeable permanent road construction or decrease due to watershed restoration actions. Proposed temporary roads are not included in this calculation because they would be removed following project activities. This value is an indicator of change to watershed risks associated with roads.

Net Encroaching Roads shows the net change in miles for inventoried roads which hydraulically modify streamflows at bankfull stage. Encroaching roads also are a source of sediment. Current encroaching roads miles by watershed are displayed in the "Watershed Characteristics, Condition Indicators, and Dominant Watershed Disturbances" tables. Restoration actions such as road obliteration can reduce this value and lead to improvements within the watershed.

In the Draft EIS, five additional parameters were initially identified. However, they were found not to be driving variables within the scope of this project. These parameters include the number of road crossings per mile of stream (crossing frequency); the percent of hydrologic openings in a watershed; the percent of stream miles modified by encroaching road (GIS roads within a 50-foot buffer of the GIS stream layer); the miles of those modified reaches that have reduced the potential for direct shade to the stream reach (direct shade reduction); and road density.

Direct, Indirect and Cumulative Effects at the Analysis Area (Watershed) Scale

Hayden Lake Analysis Area

Cumulative Effects

The cumulative effects analysis area in the Hayden Lake watershed extends from the headwaters in each of the tributaries to the National Forest boundary and private ownership. No short- or long-term effects to beneficial uses are expected at the watershed scale. There is an indication that a short-term increase in sediment can be expected under Alternative D, with no apparent increases in peak flows under any of the alternatives. This modeled increase is an indicator that an increase in sediment is possible. However, watershed improvement work would eliminate known and potential sediment sources, which would more than compensate for potential management impacts.

At the watershed scale, there would be no measurable direct, indirect or cumulative effects on the timing, magnitude or quantity of flow under any of the alternatives. Under Alternative D, the indicated increase in sediment from management activities represents a slight, short-term risk to beneficial uses, but is not expected to adversely affect any of those beneficial uses. Sediment risk reductions due to restoration actions under all alternatives would exceed any short-term increases. Local or watershed-scale changes in flood frequency would not be measurable or affect either the stream or channel structure. Alterations in hillslope processes would not affect values or beneficial uses. Net risk reductions in sediment from culvert upgrades and encroaching road removal, and a net decrease in road channel crossings may not be measurable at this scale. However, sediment reductions from restoration work would contribute to the stability of the stream channel at the watershed scale in various areas in all alternatives except Alternative A.

Cumulatively, there would be no measurable short- or long-term effects to stream condition or hillslope hydrology. Short-term fine sediment would occur in localized areas immediately following new road construction and reconstruction of existing roads in certain tributaries, however the majority of the sediment would be controlled with the implementation of Best Management Practices (BMPs). No adverse effects to beneficial uses would be expected. Risk of future sediment loading, primarily at the road channel crossings and along road sections that directly encroach on the stream channels, would be substantially and permanently reduced with planned watershed improvement activities. The pollutant of concern (sediment) that has caused the Hayden Lake Watershed to be listed as a Water Quality Limited would be substantially reduced in the both short- and long-term because of reductions stream crossings and encroaching roads.

Table III-48. Projected watershed response in the Hayden Lake Watershed, by alternative.

WATERSHED NAME: Hayden Lake Watershed	HUC: 1701030512
TRIBUTARY: Hayden Lake Watershed	HUC: 1701030512

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Sediment yield (%)	148	148	148	150	148	148	148
Peak flow (%)	5	5	5	5	5	5	5
Net stream crossings (#)	0	-10	-12	-27	-10	-10	-47
Net associated risk (tons/year)	0	-130	-131	-183	-130	-128	-321
Net roads (miles)	0	-10	-11	-19	-10	-10	-26
Net encroaching road (miles)	0	-1.9	-1.9	-2.4	-1.9	-1.9	-3.1

Note: The sediment yield and peak flow change estimates in the table represent the cumulative expected responses as a result of forest management activities over time and throughout the watershed represented. The estimates assume standard BMPs and Soil and Water Conservation Practices are employed. The four "net change" lines in the table are an accounting of the driving disturbance and restoration elements in this project. When non-standard site-specific BMPs and restoration practices associated with these alternative are incorporated into the analyses, the synthesis of these analyses yields the conclusions of cumulative, direct, and indirect effects that follow. An explanation of each measure of change displayed in the table is provided under "Methodology" at the beginning of the Environmental Consequences for Watershed, above.

Direct and Indirect Effects at the Tributary and Localized Scales

At the tributary scale, no direct or indirect effects to beneficial uses are anticipated from harvest activities and road construction under any of the alternatives, including the No-Action Alternative. The short-term increase in sediment associated with Alternative D would not be measurable at the tributary scale. The implementation of Best Management Practices (BMPs) and adherence with the Inland Native Fish Strategy would provide protection for riparian habitat and control the majority of the sediment associated with these activities. The sediment yield and peak flow estimates in the table represent the cumulative expected responses based on forest development activities over time throughout the watershed. The estimates assume standard BMPs and Soil and Water Conservation Practices.

Proposed management activities would result in limited, short-term sediment inputs in localized areas within individual tributaries. Limited sediment inputs would occur in areas of new road construction and road reconstruction that are in close proximity to stream channels. Implementation of Best Management Practices would reduce potential sediment loading at these localized areas. Where culverts are being installed, they would be engineered to meet 100-year flood events, reducing the sediment risk of failure. Potential increases in sediment associated with logging and roads under Alternative D would minimal, and even without the substantial restoration effects that would reduce sediment risk, would not be expected to have an effect on channel conditions.

Alternatives C and D propose between 10 to 20 acres of tractor logging on sensitive landtypes. In addition, approximately 0.5 miles of new road (system and temporary) would be constructed on sensitive landtypes in all alternatives except A and C. The direct effect of proposed harvest and roads adjacent to small first-order streams would include minimal delivery of sediment at localized sites, but no measurable indirect effects to streams with the implementation of riparian buffers and BMP's. In addition, featured watershed restoration in includes the obliteration of approximately 5 miles of roads and channel crossings under Alternatives B, C, E, and F, with 7 miles of road under Alternative D on sensitive landtypes.

Watershed improvements from restoration would outweigh potential management impacts. Channel conditions would improve over the long term, especially in the alternatives that reduce encroaching road miles. Sediment reductions would be associated with reducing stream channel crossings, road miles, and encroaching roads in the North Fork of Hayden Creek under Alternatives D and G, and in the East Fork of Hayden Creek under all of the action alternatives. The direct effect of this work would be a short-term introduction of fine sediment at localized sites, which is not expected to adversely affect channel conditions. Other direct effects include reducing the risk

of channel crossing failure and the contributing area. Removing culverts eliminates flow constriction which in turn reduces flow velocities at local sites. By reducing the contributing area, this might trend the localized tributaries towards reduced peak flows.

Indirect effects of the watershed improvement work includes decreasing fine sediment and bedload sources, increasing flood-prone area, reducing risks of catastrophic channel failures, and allowing streams to dynamically adjust to flows and sediment. At this scale in the watershed, this would provide a gradual decline in sediment routing downstream, which in turn would provide improved conditions for beneficial uses.

Sediment reduction is most noticeable at localized sites where encroaching roads are removed. Removal of encroaching road sections varies by alternative. These sites in the Hayden Lake Watershed include Bradbury Gulch, Hollister Creek, the upper reach in the main North Fork of Hayden Creek, Ulrich Creek, and Jim Creek. Substantial improvement in stream conditions would be observed at these sites. The direct effects of encroaching road removal include removing immediate sediment sources and constrictions to flow, reducing local velocities, and allowing streams to access their flood-prone area. Indirect effects include eliminating channel erosion sources, increasing flood-prone area, restoring hydraulic functions, and improving fish habitat. Overall these activities would substantially improve along these sections of stream.

The direct and indirect effects of canopy removal at localized sites under all alternatives would be altered snow accumulation patterns and melt rates. Some change in timing, and increases in the magnitude and quantity of flow would occur under all alternatives at individual sites. The increase in flow would be primarily due to the mortality of trees from the Douglas-fir beetle. Additional mortality due to harvest of green trees would not result in a measurable increase in magnitude or quantity of flows for any of the alternatives. No measurable effects would occur in stream channel conditions.

The cumulative effects from management activities over the No-Action Alternative would not be measurable at the tributary scale for increases in peak flows or sediment. However, cumulative benefits at the tributary scale due to watershed improvement and the reduction of sediment may be noticeable, enhancing stream conditions and water quality in some of the localized reaches. More detailed information is available in the watershed reports in the project files.

Table III-49. Projected watershed response in the Hayden Creek Watershed above Lancaster Creek, by Alternative.

WATERSHED NAME: Hayden Lake Watershed	HUC: 1701030512
TRIBUTARY: Hayden Creek above Lancaster Creek	HUC: 170103051201

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Sediment yield (%)	157	157	157	159	157	157	157
Peak flow (%)	5	5	5	5	5	5	5
Net stream crossings (#)	0	-6	-7	-23	-6	-6	-39
Net associated risk (tons/year)	0	-68	-68	-121	-68	-66	-147
Net roads (miles)	0	-6	-7	-16	-6	-6	-26
Net encroaching road (miles)	0	-0.3	-0.3	-0.8	-0.3	-0.3	-1.5

Note: The sediment yield and peak flow change estimates in the table represent the cumulative expected responses as a result of forest management activities over time and throughout the watershed represented. The estimates assume standard BMPs and Soil and Water Conservation Practices are employed. The four "net change" lines in the table are an accounting of the driving disturbance and restoration elements in this project. When non-standard site-specific BMPs and restoration practices associated with these alternative are incorporated into the analyses, the synthesis of these analyses yields the conclusions of cumulative, direct, and indirect effects that follow. An explanation of each measure of change displayed in the table is provided under "Methodology" at the beginning of the Environmental Consequences for Watershed, above.

Coeur d'Alene Lake Analysis Area

This section contains the effects analyses for the following group of watersheds:

- *Fernan Lake*
- *Wolf Lodge Creek*
- *Beauty Creek*
- *Carlin Creek*
- *Cedar Creek*
- *Fourth of July Creek*

Fernan Lake Watershed

Cumulative Effects

The cumulative effects analysis area in the Fernan Lake watershed extends from the headwaters near Fernan Saddle to a point on Fernan Creek approximately 3 miles above Fernan Lake. The lower portions of Fernan Creek below Dry Gulch are under private ownership. No short- or long-term cumulative effects to beneficial uses are expected at the watershed scale in any alternative. There is an indication that a short-term increase in sediment can be expected in Alternative B, D, E and F, along with an increase in peak flow under Alternative D. These modeled increases are indicators that an increase in sediment is possible. However, watershed improvement work would eliminate known and potential sediment sources, which would more than compensate for potential management impacts.

At the watershed scale, there would be no measurable direct, indirect or cumulative effects on the timing, magnitude or quantity of flow under any of the action alternatives. Under Alternative D, the indicated increase in peak flow and sediment from logging activities represents a slight, short-term risk to beneficial uses, but is not expected to adversely affect any of those beneficial uses. Sediment risk reductions due to restoration actions under all alternatives would exceed any short-term increases associated with logging. Local or watershed-scale changes in flood frequency would not be measurable or affect either the stream or channel structure. Alterations in hillslope processes would not affect values or beneficial uses. Net risk reductions in sediment from culvert upgrades, removal of encroaching roads, and a net decrease in road channel crossings may not be measurable at

the watershed scale. However, sediment reductions from restoration work would contribute to the stability of the stream channel at the watershed scale in various areas in all the alternatives.

Cumulatively, there would be no measurable short- or long-term effects to stream condition or hillslope hydrology. Short-term fine sediment would occur in localized areas immediately following new road construction and reconstruction of existing roads in certain tributaries, however the majority would be controlled with the implementation of Best Management Practices. No adverse effects to beneficial uses would be expected. Risk of future sediment loading, primarily at the road channel crossings and along sections of road that directly encroach on the stream channels, would be substantially and permanently reduced with planned watershed improvement activities. The pollutant of concern (sediment) that has caused the Fernan Lake Watershed to be listed as Water Quality Limited would be substantially reduced in both the short and long term because of reductions in stream crossings and encroaching roads.

Table III-50. Projected watershed response in the Fernan Lake Watershed, by alternative.

WATERSHED NAME: Fernan Lake	HUC: 170103030201
TRIBUTARY: Fernan Creek	HUC: 170103030201

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Sediment yield (%)	149	150	149	151	150	150	149
Peak flow (%)	8	8	8	9	8	8	8
Net stream crossings (#)	-4	-38	-42	-34	-38	-38	-42
Net associated risk (tons/year)	-8	-122	-127	-122	-122	-127	-130
Net roads (miles)	-.5	-15	-17	-13	-15	-15	-17
Net encroaching road (miles)	0	-.8	-.8	-.8	-.8	-.8	-.8

Note: The sediment yield and peak flow change estimates in the table represent the cumulative expected responses as a result of forest management activities over time and throughout the watershed represented. The estimates assume standard BMPs and Soil and Water Conservation Practices are employed. The four "net change" lines in the table are an accounting of the driving disturbance and restoration elements in this project. When non-standard site-specific BMPs and restoration practices associated with these alternative are incorporated into the analyses, the synthesis of these analyses yields the conclusions of cumulative, direct, and indirect effects that follow. An explanation of each measure of change displayed in the table is provided under "Methodology" at the beginning of the Environmental Consequences for Watershed, above.

Direct and Indirect Effects at the Tributary and Localized Scales

At the tributary scale, no direct or indirect effects to beneficial uses are anticipated from harvest activities and road construction under any of the alternatives, including the No-Action Alternative. The short-term increase in sediment estimated by the model under Alternative B, D, E and F would not be measurable at the tributary scale. The implementation of Best Management Practices (BMPs) and adherence with the Inland Native Fish Strategy would provide protection for riparian habitat and control the majority of the sediment associated with these activities. The sediment yield and peak flow estimates in the table represent the cumulative expected responses based on forest development activities over time throughout the watershed. The estimates assume standard BMPs and Soil and Water Conservation Practices.

Proposed management activities would result in limited, short-term sediment inputs in localized areas within individual tributaries. Limited sediment inputs would occur in areas of new road construction and road reconstruction that are in close proximity to stream channels. Implementation of Best Management Practices would reduce potential sediment loading at these localized areas. Where culverts are being installed, they would be engineered to meet 100-year flood events, reducing the sediment risk of failure. Potential increases in sediment associated with logging and roads under Alternative D would minimal, and even without the substantial restoration effects that would reduce sediment risk, would not be expected to have an effect on channel conditions.

Alternatives B, C, E and F propose approximately 7 acres of tractor logging on sensitive landtypes. Alternative D proposes harvest 153 acres. In addition, approximately 0.3 miles of new road (system and temporary) would be constructed on sensitive landtypes under Alternatives B, D, E and F. The direct effect of proposed harvest and roads adjacent to small first-order streams would include the delivery of sediment at localized sites, but measurable indirect effects to streams would be mitigated by the implementation of riparian buffers and BMP's. In addition, featured watershed restoration in all of the action alternatives includes the obliteration of approximately 2 miles of roads and channel crossings on sensitive landtypes. Other proposed restoration reduces stream channel crossings, road miles, and encroaching roads on non-sensitive landtypes in all action alternatives.

Watershed improvements from restoration would outweigh potential management impacts. Channel conditions would improve over the long term, especially in the alternatives that reduce encroaching road miles (Alternatives B through G). The direct effect of this work would be a short-term introduction of fine sediment at localized sites, which would not be expected to adversely affect channel conditions and fish habitat. Other direct effects include reducing the contributing area and the failure risk at channel crossings. Reducing the contributing area might trend the localized tributaries towards reduced peak flows. Removing culverts eliminates flow constriction which in turn reduces flow velocities at local sites.

Sediment reductions would be greatest at localized sites where encroaching roads are removed. Road 1562 up Dry Gulch encroaches on the stream for 0.8 miles and is one of the main contributors of sediment to the stream. Substantial improvement in stream conditions would be observed with the removal of this road. Direct effects include removing immediate sediment sources and flow constrictions, reducing local velocities, and allowing the stream to access its floodplain area. Indirect effects include elimination of channel erosion sources and improved fish habitat. Stream conditions would be substantially improved along this section of Dry Gulch.

Indirect effects of the watershed improvement work includes decreasing fine sediment and bedload sources, increasing flood-prone area, decreasing risks of catastrophic channel failures, and increasing the stream's ability to dynamically adjust to flows and sediment. At this scale in the watershed, this would gradually reduce sediment routing downstream and improve stream conditions for beneficial uses.

The direct and indirect effects of canopy removal at localized sites under all alternatives would be altered snow accumulation patterns and melt rates. Some change in timing, and increases in the magnitude and quantity of flow would occur under all alternatives at individual sites. The increase in flow would be primarily due to the mortality of trees from the Douglas-fir beetle. Additional mortality due to harvest of green trees would not result in a measurable increase in magnitude or quantity of flows for any of the alternatives. No measurable effects would occur in stream channel conditions.

The cumulative effects from management activities over the No-Action Alternative would not be measurable at the tributary scale for increases in peak flows or sediment. However, cumulative benefits at the tributary scale due to watershed improvement and the reduction of sediment may be noticeable, enhancing stream conditions and water quality in some of the localized reaches. More detailed information is available in the watershed reports in the project files.

Wolf Lodge Creek Watershed

Cumulative Effects

The cumulative effects analysis area in the Wolf Lodge Creek watershed extends from the headwaters to below the confluence of Marie Creek. No short- or long-term effects to beneficial uses are expected at the watershed scale in any alternative. There is an indication that a short-term increase in sediment can be expected in Alternative D, with no apparent increases in peak flows under any of the alternatives. This modeled increase indicates that an increase in sediment is possible. However, watershed improvement work would eliminate known and potential sediment sources, which would more than compensate for potential management impacts.

At the watershed scale there would be no measurable direct, indirect or cumulative effects on the timing, magnitude or quantity of flow for any of the alternatives. Under Alternative D, the indicated increase in peak flow from management activities represents a slight, short-term risk to beneficial uses, but is not expected to adversely affect any of those beneficial uses. Sediment risk reductions due to restoration actions under all alternatives would exceed any short-term increases associated with harvest method or road work. Local or watershed-scale changes in flood frequency would not be measurable or affect either the stream or channel structure at this scale. Alterations in hillslope processes would not affect values or beneficial uses at the watershed scale. Net risk reductions in sediment from culvert upgrades and a net decrease in road channel crossings may not be measurable at the watershed scale. However, sediment reductions from restoration work would contribute to the stream channel stability at the watershed scale in various areas in all alternatives.

Cumulatively, there would be no measurable short- or long-term effects to stream condition or hillslope hydrology. Short-term fine sediment would occur in localized areas immediately following new road construction and reconstruction of existing roads in certain tributaries, however the majority of sediment would be controlled with the implementation of Best Management Practices. No adverse effects to beneficial uses is expected. Risk of future sediment loading, primarily at the road channel crossings, would be substantially and permanently reduced with planned watershed improvement activities under all of the alternatives. The pollutant of concern (sediment) that has caused Wolf Lodge Creek to be listed as a Water Quality Limited would be substantially reduced in both the short- and long-term because of net reductions in stream crossings.

Table III-51. Projected watershed response in the Wolf Lodge Creek Watershed, by alternative.

WATERSHED NAME: Wolf Lodge Creek Watershed	HUC: 1701030306
TRIBUTARY: Wolf Lodge Creek	HUC: 1701030306

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Sediment yield (%)	74	74	74	76	74	74	74
Peak flow (%)	4	4	4	4	4	4	4
Net stream crossings (#)	-14	-29	-29	-39	-29	-29	-41
Net associated risk (tons/year)	-56	-193	-195	-220	-193	-193	-237
Net roads (miles)	-1	-12	-12	-16	-12	-12	-18
Net encroaching road (miles)	0	0	0	0	0	0	0

Note: The sediment yield and peak flow change estimates in the table represent the cumulative expected responses as a result of forest management activities over time and throughout the watershed represented. The estimates assume standard BMPs and Soil and Water Conservation Practices are employed. The four "net change" lines in the table are an accounting of the driving disturbance and restoration elements in this project. When non-standard site-specific BMPs and restoration practices associated with these alternative are incorporated into the analyses, the synthesis of these analyses yields the conclusions of cumulative, direct, and indirect effects that follow. An explanation of each measure of change displayed in the table is provided under "Methodology" at the beginning of the Environmental Consequences for Watershed, above.

Direct and Indirect Effects at the Tributary and Localized Scales

At the tributary scale no direct or indirect effects to beneficial uses are anticipated from harvest activities and road construction under any of the action alternatives. The short-term increase in sediment estimated by the model under Alternative D would not be measurable at the tributary scale. The implementation of Best Management Practices and adherence to the Inland Native Fish Strategy would provide protection for riparian habitat and control the majority of the sediment associated with these activities. The sediment yield estimates in the table represent the cumulative expected responses based on forest development activities over time throughout the watershed. The estimates assume standard Best Management Practices and Soil and Water Conservation Practices.

Proposed management activities would result in limited, short-term sediment inputs in localized areas within individual tributaries. Limited sediment inputs would occur in areas of new road construction and road

reconstruction that are in close proximity to stream channels. Implementation of Best Management Practices would reduce potential sediment loading at these localized areas. Where culverts are being installed, they would be engineered to meet 100-year flood events, reducing the sediment risk of failure. Potential increases in sediment associated with logging and roads under Alternative D would be minimal, and even without the substantial restoration effects that would reduce sediment risk, would not be expected to have an effect on channel conditions.

All the action alternatives propose approximately 20 to 30 acres of tractor logging on sensitive landtypes. In addition, approximately 0.2 miles of new road (system and temporary) would be constructed on sensitive landtypes under Alternatives B, D, E and F. The direct effect of proposed harvest and roads adjacent to small first-order streams would include minimal delivery of sediment at localized sites, but no measurable indirect effects to streams due to the implementation of riparian buffers and Best Management Practices. In addition, featured watershed restoration under all of the action alternatives includes the obliteration of approximately one mile of road and channel crossings under Alternatives B, C, E, and F, and two miles under Alternative D on sensitive landtypes.

Foreseeable activities associated with the upcoming Horizon Moon Timber Sale include additional road construction within Stella Creek and Wolf Lodge Creek. The timber sale was approved in a decision based on the Horizon Resource Area Final Environmental Impact Statement (USDA Forest Service, 1991.) The decision included two timber sales: The Horizon *Sun* Sale is expected to be completed in the near future. The Horizon *Moon* Sale has not been implemented to date. This activity would cause a short-term risk of increased sediment. Implementation of Best Management Practices and adherence to the Inland Native Fish Strategy would provide protection for riparian habitat and control of the majority of the sediment associated with these activities. The sediment yield and peak flow estimates in the table represent the cumulative expected responses based on forest development activities over time throughout the watershed. The estimates assume standard Best Management Practices and Soil and Water Conservation Practices. When the non-standard site-specific Best Management Practices and restoration practices associated with these alternatives are incorporated in the cumulative effects analyses, there is a substantial net reduction in terms of sediment loading and risk to water resources. Furthermore, installation of new culverts would be engineered to meet 100-year flow events reducing the risk for potential failures.

Sediment reductions would be associated with reducing stream channel crossings under all of the alternatives, and with the reduction of road miles on sensitive landtypes in all the action alternatives within the tributaries of Wolf Lodge Creek. The direct effect of this work would be a short-term introduction of fine sediment at localized sites The effects of the incidental sediment would mostly show as turbidity and would not be expected to adversely affect channel conditions and fish habitat. Other direct effects include reducing the risk of channel crossing failure and the contributing area. By removing high-risk culverts, flow constriction is eliminated which in turn reduces highly erosive flow velocities at local sites. By reducing the contributing area (where cut slopes intercept slow moving subsurface water and route it quickly instead to stream courses), that contribution to increased local peak flows would be reduced.

Indirect effects of the watershed improvement work includes decreasing fine sediment and bedload sources, increasing flood-prone area, reducing risks of catastrophic channel failures, and allowing streams to dynamically adjust to flows and sediment. At this scale in the watershed, this would provide a gradual decline in sediment routing downstream, which would provide improved conditions for beneficial uses.

The direct and indirect effects of canopy removal at localized sites under all alternatives would be altered snow accumulation patterns and melt rates. Some change in timing, and increases in the magnitude and quantity of flow would occur under all alternatives at individual sites. The increase in flow would be primarily due to the mortality of trees from the Douglas-fir beetle. Additional mortality due to harvest of green trees would not result in a measurable increase in magnitude or quantity of flows for any of the alternatives. No measurable effects would occur in stream channel conditions.

The cumulative effects from management activities most likely would not be discernible at this scale for increases in peak flows or sediment over Alternative A. However, cumulative benefits at the tributary scale due to watershed improvement and the reduction of sediment may be noticeable, enhancing stream conditions and water quality in some of the localized reaches. More detailed information is available in the watershed reports in the project files.

Table III-52. Projected watershed response in the Marie Creek Tributary of the Wolf Lodge Creek Watershed, by alternative.

WATERSHED NAME: Wolf Lodge Creek Watershed	HUC: 1701030306
TRIBUTARY: Marie Creek	HUC: 170103030602

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Sediment yield (%)	63	63	63	66	63	63	63
Peak flow (%)	4	4	4	4	4	4	4
Net stream crossings (#)	-6	-13	-13	-11	-13	-13	-13
Net associated risk (tons/year)	-12	-41	-43	-41	-41	-41	-43
Net roads (miles)	-3	-6	-8	-6	-6	-6	-8
Net encroaching road (miles)	0	0	0	0	0	0	0

Note: The sediment yield and peak flow change estimates in the table represent the cumulative expected responses as a result of forest management activities over time and throughout the watershed represented. The estimates assume standard BMPs and Soil and Water Conservation Practices are employed. The four "net change" lines in the table are an accounting of the driving disturbance and restoration elements in this project. When non-standard site-specific BMPs and restoration practices associated with these alternative are incorporated into the analyses, the synthesis of these analyses yields the conclusions of cumulative, direct, and indirect effects that follow. An explanation of each measure of change displayed in the table is provided under "Methodology" at the beginning of the Environmental Consequences for Watershed, above.

Table III-53. Projected watershed response in the Stella Creek (Upper Wolf Lodge Creek) Tributary of the Wolf Lodge Creek Watershed, by alternative.

WATERSHED NAME: Wolf Lodge Creek Watershed	HUC: 1701030306
TRIBUTARY: Stella Creek (upper Wolf Lodge Creek tributary)	

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Net stream crossings (#)	-10	-10	-10	-19	-10	-10	-19
Net associated risk (tons/year)	-23	-61	-61	-75	-61	-61	-82
Net roads (miles)	2	2	2	-4	2	2	-4
Net encroaching road (miles)	0	0	0	0	0	0	0

Note: The sediment yield and peak flow change estimates in the table represent the cumulative expected responses as a result of forest management activities over time and throughout the watershed represented. The estimates assume standard BMPs and Soil and Water Conservation Practices are employed. The four "net change" lines in the table are an accounting of the driving disturbance and restoration elements in this project. When non-standard site-specific BMPs and restoration practices associated with these alternative are incorporated into the analyses, the synthesis of these analyses yields the conclusions of cumulative, direct, and indirect effects that follow.

Beauty Creek Watershed

Cumulative Effects

The cumulative effects analysis area in the Beauty Creek watershed extends from the headwaters to Coeur d'Alene Lake. No short- or long-term cumulative effects to beneficial uses are expected in any alternative. No changes in sediment yields or peak flows are anticipated under any of the alternatives. There would be no direct or indirect or cumulative effects on the timing, magnitude or quantity of flow under any alternative at the watershed scale. Local or watershed-scale changes in flood frequency would not be measurable or affect stream

or channel structure at this scale. Alterations in hillslope processes would not affect values or beneficial uses at the watershed scale. Net reductions in sediment from culvert upgrades and a net decrease in road channel crossings would not be measurable at this scale. However, substantial sediment reductions from restoration work would contribute to the stream channel stability at the watershed scale in various areas under all alternatives, except in Alternatives A and F.

Cumulatively, there would be no measurable short- or long-term effects to stream condition or hillslope hydrology. Short-term fine sediment would occur in localized areas immediately following new road construction and existing road reconstruction in certain tributaries, however the majority of sediment should be controlled with the implementation of Best Management Practices. No adverse effects to beneficial uses would be expected. Risk of future sediment loading, primarily at the road channel crossings and along sections of road that directly encroach on the stream channels, would be substantially and permanently reduced with planned watershed improvement activities. There are no Water Quality Limited Stream segments within the Beauty Creek Watershed; however the watershed and the stream are functioning at risk because of a long history of disturbances, including historic mineral developments.

Table III-54. Projected watershed response in the Beauty Creek Tributary of the Coeur d'Alene Lake Watershed, by alternative.

WATERSHED NAME: Coeur d'Alene Lake Area	HUC: 170103030901
TRIBUTARY: Beauty Creek	HUC: 170103030901

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Sediment yield (%)	115	115	115	115	115	115	115
Peak flow (%)	5	5	5	5	5	5	5
Net stream crossings (#)	0	-15	-15	-15	-15	0	-19
Net associated risk (tons/year)	0	-107	-107	-107	-107	0	-134
Net roads (miles)	0	-13	-13	-13	-13	0	-13
Net encroaching road (miles)	0	-1	-1	-1	-1	0	-1

Note: The sediment yield and peak flow change estimates in the table represent the cumulative expected responses as a result of forest management activities over time and throughout the watershed represented. The estimates assume standard BMPs and Soil and Water Conservation Practices are employed. The four "net change" lines in the table are an accounting of the driving disturbance and restoration elements in this project. When non-standard site-specific BMPs and restoration practices associated with these alternative are incorporated into the analyses, the synthesis of these analyses yields the conclusions of cumulative, direct, and indirect effects that follow. An explanation of each measure of change displayed in the table is provided under "Methodology" at the beginning of the Environmental Consequences for Watershed, above.

Direct and Indirect Effects at the Tributary and Localized Scales

At the tributary scale no direct or indirect effects to beneficial uses are anticipated from harvest activities and road reconstruction under any of the alternatives, including the No-Action Alternative. The implementation of Best Management Practices and adherence to the Inland Native Fish Strategy would provide protection for the riparian habitat. Sediment reductions would be associated with a net reduction in stream channel crossings and road miles under all of the alternatives, except Alternatives A and F. Channel conditions would show improvement over the long term under these alternatives.

Proposed management activities would result in limited, short-term sediment inputs in localized areas within individual tributaries. Limited sediment inputs would occur in areas of new road construction and road reconstruction that are in close proximity to stream channels. Implementation of Best Management Practices would reduce potential sediment loading at these localized areas. Where culverts are being installed, they would be engineered to meet 100-year flood events, reducing the sediment risk of failure.

Alternatives D proposes approximately 8 acres of tractor logging on sensitive landtypes. No new roads (system or temporary) would be constructed on sensitive landtypes in any of the alternatives. The direct or indirect effects

of the proposed harvest would not be measurable to the stream channel due to the implementation of riparian buffers and BMP's. In addition, featured watershed restoration under Alternatives B, C, D, E and G includes the obliteration of approximately 2 miles of roads and channel crossings on sensitive landtypes.

The direct effect of watershed improvement work would be a short-term introduction of fine sediment at localized sites that would not be expected to adversely affect channel conditions. Other direct effects include reducing the contributing area and the risk for channel crossing failure. Reducing the contributing area might trend the localized tributaries towards reduced peak flows. Removing culverts eliminates flow constriction which in turn reduces flow velocities at local sites.

Indirect effects of the watershed improvement work include decreasing fine sediment and bedload sources, increasing flood-prone area, decreasing risks of catastrophic channel failures, and increasing the stream's ability to dynamically adjust to flows and sediment. At this scale in the watershed, this would provide a gradual decline in sediment routing downstream which would provide improved conditions for beneficial uses.

The direct and indirect effects of canopy removal at localized sites under all alternatives would be altered snow accumulation patterns and melt rates. Some change in timing, and increases in the magnitude and quantity of flow would occur under all alternatives at individual sites. The increase in flow would be primarily due to the mortality of trees from the Douglas-fir beetle. Additional mortality due to harvest of green trees would not result in a measurable increase in magnitude or quantity of flows for any of the alternatives. No measurable effects would occur in stream channel conditions.

The cumulative effects from management activities most likely would not be discernible at this scale for increases in peak flows or in sediment over what would occur under Alternative A. However, cumulative benefits at the tributary scale due to watershed improvement and the reduction of sediment may be noticeable, enhancing stream conditions and water quality in some of the localized reaches. More detailed information is available in the watershed reports in the project files.

Carlin Creek Watershed

Cumulative Effects

The cumulative effects analysis area in the Carlin Creek watershed extends from the headwaters National Forest and private ownership boundaries. No short- or long-term effects to beneficial uses are expected at the watershed scale. No changes in sediment yields or peak flows are anticipated under any of the alternatives. There would be no measurable direct or indirect or cumulative effects on the timing, magnitude or quantity of flow under any alternative at the watershed scale. Local or watershed-scale changes in flood frequency would not be measurable or affect stream or channel structure at this scale. Alterations in hillslope processes would not affect values or beneficial uses at the watershed scale. Net reductions in sediment from removing channel crossings and upgrading culverts would not be measurable at this scale. However, sediment reductions from restoration work would contribute to the stream channel stability at the watershed scale in various areas in all alternatives.

Cumulatively, there would be no measurable short- or long-term effects to stream condition or hillslope hydrology. Short-term fine sediment would occur in localized areas immediately following culvert upgrades and removal of road channel crossings in certain tributaries, however, the majority should be controlled with the implementation of Best Management Practices. No adverse effects to beneficial uses would be expected. Risk of future sediment loading, primarily at the road channel crossings, would be substantially and permanently reduced with planned watershed improvement activities under all alternatives. The pollutant of concern (sediment) that has caused Carlin Creek to be listed as a Water Quality Limited would be substantially reduced in both the short and long term because of reductions in stream crossings.

Table III-55. Projected watershed response in the Carlin Creek Tributary of the Coeur d'Alene Lake Watershed, by alternative.

WATERSHED NAME: Coeur d'Alene Lake Area	HUC: 170103035001
TRIBUTARY: Carlin Creek	HUC: 170103035001

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Sediment yield (%)	64	64	64	64	64	64	64
Peak flow (%)	8	8	8	8	8	8	8
Net stream crossings (#)	-16	-19	-19	-19	-19	-19	-19
Net associated risk (tons/year)	-121	-127	-127	-127	-127	-127	-127
Net roads (miles)	-7	-9	-9	-9	-9	-9	-9
Net encroaching road (miles)	0	0	0	0	0	0	0

Note: The sediment yield and peak flow change estimates in the table represent the cumulative expected responses as a result of forest management activities over time and throughout the watershed represented. The estimates assume standard BMPs and Soil and Water Conservation Practices are employed. The four "net change" lines in the table are an accounting of the driving disturbance and restoration elements in this project. When non-standard site-specific BMPs and restoration practices associated with these alternative are incorporated into the analyses, the synthesis of these analyses yields the conclusions of cumulative, direct, and indirect effects that follow. An explanation of each measure of change displayed in the table is provided under "Methodology" at the beginning of the Environmental Consequences for Watershed, above.

Direct and Indirect Effects at the Tributary and Localized Scales

At the tributary scale no measurable direct or indirect effects to beneficial uses are anticipated from harvest activities and road reconstruction under any of the alternatives, including the No-Action Alternative. The implementation of Best Management Practices and adherence to the Inland Native Fish Strategy would provide protection for the riparian habitat. Sediment reductions would be associated with culvert upgrades and with the net reduction in stream channel crossings and road miles under all alternatives with the foreseeable activities. Channel conditions would show improvement over the long term.

The direct effect of the watershed improvement work would be a short-term introduction of fine sediment at localized sites, which would not be expected to adversely affect channel conditions and fish habitat. Other direct effects include reducing the contributing area and the risk for channel crossing failure. Reducing the contributing area might trend the localized tributaries towards reduced peak flows. Removing culverts eliminates flow constriction which reduces flow velocities at local sites.

Indirect effects of the watershed improvement work includes decreasing fine sediment and bedload sources, increasing flood-prone area, decreasing risks of catastrophic channel failures, and increasing the stream's ability to dynamically adjust to flows and sediment. At this scale in the watershed, this would provide a gradual decline in sediment routing downstream which would provide improved conditions for beneficial uses.

No activities are scheduled, either tractor skidding or road construction, on sensitive landtypes.. Featured watershed restoration associated with foreseeable watershed improvement work includes the obliteration of approximately a half mile of road and channel crossings on sensitive landtypes.

The direct and indirect effects of canopy removal at localized sites under all alternatives would be altered snow accumulation patterns and melt rates. Some change in timing, and increases in the magnitude and quantity of flow would occur under all alternatives at individual sites. The increase in flow would be primarily due to the mortality of trees from the Douglas-fir beetle. Additional mortality due to harvest of green trees would not result in a measurable increase in magnitude or quantity of flows for any of the alternatives. No measurable effects would occur in stream channel conditions.

The cumulative effects from management activities most likely would not be discernible at this scale for increases in peak flows or sediment over what would occur under the No-Action Alternative. However, cumulative

benefits at the tributary scale due to watershed improvement and sediment reduction may be noticeable, enhancing stream conditions and water quality in some of the localized reaches. More detailed information is available in the watershed reports in the project files.

Cedar Creek Watershed

Cumulative Effects

The cumulative effects analysis area in the Cedar Creek watershed extends from the headwaters to the confluence with Wolf Lodge Creek. No short- or long-term effects to beneficial uses would be expected at the watershed scale. No changes in sediment yields or peak flows are anticipated in any of the alternatives. There would be no measurable direct, indirect or cumulative effects on the timing, magnitude or quantity of flow under any alternative at the watershed scale. Local or watershed-scale changes in flood frequency would not be measurable or affect either the stream or channel structure at this scale. Alterations in hillslope processes would not affect values or beneficial uses at the watershed scale. Net reductions in sediment from the culvert upgrades would not be measurable and or have direct, indirect or cumulative effects at the watershed scale.

Cumulatively, there would be no measurable short- or long-term effects to stream condition, hillslope hydrology, or fisheries habitat. Short-term fine sediment would occur in localized areas immediately following road reconstruction in certain tributaries, however the majority of the sediment should be controlled with the implementation of Best Management Practices. No adverse effects to beneficial uses are expected. Risk of future sediment loading would decrease with planned watershed improvement activities.

No alternative would add to the pollutant (sediment) that resulted in the listing of Cedar Creek as a Water Quality Limited Stream. The proposed restoration under all action alternatives would contribute to the reduction of that pollutant.

Table III-56. Projected watershed response in the Cedar Creek Watershed, by alternative.

WATERSHED NAME: Cedar Creek	HUC: 170103030501
TRIBUTARY: Cedar Creek	HUC: 170103030501

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Sediment yield (%)	134	134	134	134	134	134	134
Peak flow (%)	6	6	6	6	6	6	6
Net stream crossings (#)	0	0	0	0	0	0	0
Net associated risk (tons/year)	0	-8	-8	-8	-8	-7	-8
Net roads (miles)	0	0	0	0	0	0	0
Net encroaching road (miles)	0	0	0	0	0	0	0

Note: The sediment yield and peak flow change estimates in the table represent the cumulative expected responses as a result of forest management activities over time and throughout the watershed represented. The estimates assume standard BMPs and Soil and Water Conservation Practices are employed. The four "net change" lines in the table are an accounting of the driving disturbance and restoration elements in this project. When non-standard site-specific BMPs and restoration practices associated with these alternative are incorporated into the analyses, the synthesis of these analyses yields the conclusions of cumulative, direct, and indirect effects that follow. An explanation of each measure of change displayed in the table is provided under "Methodology" at the beginning of the Environmental Consequences for Watershed, above.

Direct and Indirect Effects at the Tributary and Localized Scales

At the tributary scale no measurable direct or indirect effects to beneficial uses are anticipated from harvest activities and road reconstruction under any of the alternatives, including the No-Action Alternative. The implementation of Best Management Practices and adherence to the Inland Native Fish Strategy would provide protection for the riparian habitat. Sediment reductions would be associated with culvert upgrades under all

alternatives except Alternative A. Channel conditions are not expected to change as a result of this work over the long term at this scale.

The direct effect of the watershed improvement work would be a short-term introduction of fine sediment at localized sites which would not be expected to adversely affect channel conditions and fish habitat. Other direct effects include reductions in failure risk at channel crossings.

Indirect effects of the watershed improvement work would be a reduced risk of catastrophic channel failures and potential sediment loading. At this scale in the watershed, this would provide a small decline in sediment routing downstream which could provide improved conditions for beneficial uses at localized sites.

All alternatives propose less than 10 acres of tractor logging on sensitive landtypes. No measurable direct or indirect effects of proposed harvest is anticipated due to the implementation of riparian buffers and BMP's.

The direct and indirect effects of canopy removal at localized sites under all alternatives would be altered snow accumulation patterns and melt rates. Some change in timing, and increases in the magnitude and quantity of flow would occur under all alternatives at individual sites. The increase in flow would be primarily due to the mortality of trees from the Douglas-fir beetle. Additional mortality due to harvest of green trees would not result in a measurable increase in magnitude or quantity of flows for any of the alternatives. No measurable effects would occur in stream channel conditions.

The cumulative effects from management activities most likely would not be discernible at this scale for increases in peak flows or sediment over Alternative A. More detailed information is available in the watershed reports in the project files.

Fourth of July Creek Watershed

Cumulative Effects

The cumulative effects analysis area in the Fourth of July Creek watershed extends from the headwaters to the boundary of National Forest and private ownership. No short- or long-term effects to beneficial uses would be expected at the watershed scale. No changes in sediment yields or peak flows are anticipated under any of the alternatives. There would be no measurable direct or indirect or cumulative effects on the timing, magnitude or quantity of flow under any alternative at the watershed scale. Local or watershed-scale changes in flood frequency would not be measurable or affect stream or channel structure at this scale. Alterations in hillslope processes would not affect values or beneficial uses at the watershed scale. Net sediment reductions due to the removal of road channel crossings and road miles would not be measurable at this scale. However, sediment reductions from restoration work would contribute to the stream channel stability at the watershed scale in all alternatives with the foreseeable watershed activities.

Cumulatively, there would be no short- or long-term effects to stream condition, hillslope hydrology, or fisheries habitat. Short-term fine sediment would occur in localized areas immediately following reconstruction of existing roads in certain tributaries, however, the majority would be controlled with the implementation of Best Management Practices. No adverse effects to beneficial uses are expected. Risk of future sediment loading, primarily at the road channel crossings, would be substantially and permanently reduced with planned watershed improvement activities in all alternatives. The pollutant of concern (sediment) that has caused Fourth of July Creek to be listed as a Water Quality Limited would be substantially be reduced in both the short- and long-term because of reductions in stream crossings.

Table III-57. Projected watershed response in the Fourth of July Creek Watershed, by alternative.

WATERSHED NAME: Fourth of July Creek	HUC: 170103030401
TRIBUTARY: Fourth of July Creek	HUC: 170103030401

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Sediment yield (%)	138	138	138	138	138	138	138
Peak flow (%)	4	4	4	4	4	4	4
Net stream crossings (#)	-33	-33	-33	-33	-33	-33	-33
Net associated risk (tons/year)	-109	-109	-109	-109	-109	-109	-109
Net roads (miles)	-20	-20	-20	-20	-20	-20	-20
Net encroaching road (miles)	0	0	0	0	0	0	0

Note: The sediment yield and peak flow change estimates in the table represent the cumulative expected responses as a result of forest management activities over time and throughout the watershed represented. The estimates assume standard BMPs and Soil and Water Conservation Practices are employed. The four "net change" lines in the table are an accounting of the driving disturbance and restoration elements in this project. When non-standard site-specific BMPs and restoration practices associated with these alternative are incorporated into the analyses, the synthesis of these analyses yields the conclusions of cumulative, direct, and indirect effects that follow. An explanation of each measure of change displayed in the table is provided under "Methodology" at the beginning of the Environmental Consequences for Watershed, above.

Direct and Indirect Effects at the Tributary and Localized Scales

At the tributary scale no measurable direct or indirect effects to beneficial uses are anticipated from harvest activities and road reconstruction under any of the alternatives, including the No-Action Alternative. The implementation of Best Management Practices and adherence to the Inland Native Fish Strategy would provide protection for the riparian habitat. The sediment reductions would be associated with the net reduction in stream channel crossings and road miles occurring under Alternative A. Channel conditions would show some improvement over the long term under all alternatives.

The direct effect of the watershed improvement work would be a short-term introduction of fine sediment at localized sites which would not be expected to adversely affect channel conditions and fish habitat. Other direct effects include reducing the contributing area and the risk for failure channel crossings. Reducing the contributing area might trend the localized tributaries towards reduced peak flows. Removing culverts eliminates flow constriction which reduces flow velocities at local sites.

Indirect effects of the watershed improvement work includes decreasing fine sediment and bedload sources, increasing flood-prone area, decreasing risks of catastrophic channel failures, and increasing the stream's ability to dynamically adjust to flows and sediment. At this scale in the watershed, this would provide a gradual decline in sediment routing downstream which, in turn, would provide improved conditions for beneficial uses.

No tractor logging or road construction would occur on sensitive landtypes in any of the alternatives.

The direct and indirect effects of canopy removal at localized sites under all alternatives would be altered snow accumulation patterns and melt rates. Some change in timing, and increases in the magnitude and quantity of flow would occur under all alternatives at individual sites. The increase in flow would be primarily due to the mortality of trees from the Douglas-fir beetle. Additional mortality due to harvest of green trees would not result in a measurable increase in magnitude or quantity of flows for any of the alternatives. No measurable effects would occur in stream channel conditions.

The cumulative effects from management activities most likely would not be discernible at this scale for increases in peak flows or sediment over what would occur under the No-Action Alternative. However, cumulative benefits at the tributary scale due to foreseeable watershed improvement and the reduction of sediment may be noticeable, enhancing stream conditions and water quality in some of the localized reaches. More detailed information is available in the watershed reports in the project files.

Chain Lakes Analysis Area

This group of effects analyses involve those watersheds and watershed areas that flow into the Chain of Lakes region in the lower Coeur d'Alene River.

Cumulative Effects

The Chain Lakes area is a large, contiguous area of independent drainages which flow into a riverine-lake complex in the lower reaches of the Coeur d'Alene River. Private land comprises most of the land between the Coeur d'Alene River and the National Forest Boundary. There are no Water Quality Limited Stream segments within the Chain Lakes Analysis Area. The cumulative effects analysis area extends from the headwaters in the National Forest to the boundary of private land. No short- or long-term effects to water resources or beneficial uses would occur at the watershed scale. A short duration increase in sediment (3%) would occur under Alternative D as a result of management practices. At the same time, substantial reductions in sediment and hydraulic disturbances to the streams would occur under all action alternatives from watershed restoration. There would be a cumulative improvement in water quality and stream conditions with no increases in sediment and peak flows in any of the other alternatives. Alterations in hillslope processes would not affect values or beneficial uses at the watershed scale. Net reductions in sediment from the removal of roads and channel crossings would not be measurable at this scale of the Chain Lakes area. However, sediment reductions from restoration work would contribute to the stream channel stability in localized areas under all alternatives. There would be no direct, indirect or cumulative effects on the timing, magnitude or quantity of flow in any alternative. Local or watershed-scale changes in flood frequency would not be measurable or affect stream or channel structure at this scale. Benefits from watershed restoration would outweigh potential management impacts.

Table III-58. Projected watershed response in the Chain Lakes Area Watershed, by alternative.

WATERSHED NAME: Chain Lakes Area	HUC: 1701030140
TRIBUTARY: Chain Lakes Area	HUC: 1701030140

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Sediment yield (%)	174	174	174	177	174	174	174
Peak flow (%)	4	2	2	2	2	2	2
Net stream crossings (#)	-28	-53	-56	-51	-53	-28	-88
Net associated risk (tons/year)	-97	-338	-341	-337	-338	-141	-405
Net roads (miles)	-18	-28	-29	-26	-28	-18	-49
Net encroaching road (miles)	0	-.5	-.5	-.5	-.5	0	-.5

Note: The sediment yield and peak flow change estimates in the table represent the cumulative expected responses as a result of forest management activities over time and throughout the watershed represented. The estimates assume standard BMPs and Soil and Water Conservation Practices are employed. The four "net change" lines in the table are an accounting of the driving disturbance and restoration elements in this project. When non-standard site-specific BMPs and restoration practices associated with these alternative are incorporated into the analyses, the synthesis of these analyses yields the conclusions of cumulative, direct, and indirect effects that follow. An explanation of each measure of change displayed in the table is provided under "Methodology" at the beginning of the Environmental Consequences for Watershed, above.

Direct and Indirect Effects at the Tributary and Localized Scales

At the tributary scale, no direct or indirect effects to beneficial uses would occur from harvest activities, road construction and reconstruction under any alternative. The short-term increase in sediment estimated under Alternative D (7%) is associated with the construction of 1.3 miles of new road construction in the Blue Lake Creek watershed, approximately 0.6 of which is on high sensitivity landtypes. This is the only proposed road construction on high sensitivity landtypes in the Chain Lakes area. Under This same alternative, approximately 7 miles of road would be obliterated in Blue Lake Creek, 4 miles of which are on high sensitivity landtypes. Benefits from the proposed restoration would outweigh potential management impacts. The implementation of

Best Management Practices and adherence to the Inland Native Fish Strategy would provide protection for the riparian habitat and control the majority of the sediment associated with management activities. The sediment yield and peak flow estimates in the table represent the cumulative expected responses from management activities over time throughout the watershed. The estimates assume standard Best Management Practices and Soil and Water Conservation Practices. When the non-standard site-specific Best Management Practices and restoration practices associated with these alternatives are incorporated in the cumulative effects analyses, there is a substantial net reduction in terms of sediment loading and risk to water resources.

Watershed restoration would reduce stream channel crossings and road miles in all the alternatives except Alternatives A and F. Approximately 15.5 miles of programmed, foreseeable road restoration would occur within the Rose Creek Watershed under all alternatives. Featured improvements proposed in the Beetle project would restoration of approximately 7 miles of road within the Blue Lake Creek Watershed. Channel conditions within the tributaries of these watersheds are expected to improve over the long term because of reduced sediment introduction and restoration of natural hydrologic function.

One direct effect of the road and stream crossing removal would be a short-term introduction of fine sediment at localized sites. The resulting turbidity would not adversely affect channel conditions or fish habitat. Other direct effects include reducing the contributing area for direct runoff and the risk of downstream sediment loading from channel crossing failures. Removing culverts eliminates flow constriction which, in turn, reduces erosive flow velocities at local sites.

Indirect effects of the watershed improvement work would decrease fine sediment and bedload sources, increasing flood-prone area, decrease risks of catastrophic channel failures, and increase the stream's ability to dynamically adjust to flows and sediment. All of these responses would contribute to the conditions that support water quality and beneficial uses.

Sediment reductions are most observable at localized sites where encroaching roads are removed. Removing the encroaching road in Cottonwood Creek (Blue Lake Watershed) would restore the natural channel function along this section of stream and improve aquatic conditions both in the short and long term. Direct effects include removing immediate sediment sources and flow constrictions, reducing local velocities, and allowing the stream to utilize its flood-prone area. Indirect effects include eliminating channel erosion sources, increasing flood-prone area, restoring hydraulic functions, and improving fish habitat. Stream conditions would improve at restored sites.

Under all action alternatives, culvert upgrades would occur in Thompson, Killarney, Fortier and Rose Creeks. A direct effect of the watershed work would be a short-term introduction of fine sediment at localized sites that would not adversely affect channel conditions and fish habitat. The direct, indirect effects would be a reduction in the risk of channel failures and a decline in sediment inputs over time. At the tributary scale, restoration would result in reduced sediment routing downstream providing improved conditions for beneficial uses. Cumulative benefits from restoration and the reduction of sediment would outweigh impacts from management activities. More detailed information is available in the project files ("Watershed").

Table III-59. Projected watershed response in the Blue Lake Creek (middle) Tributary of the Chain Lakes Area Watershed, by alternative.

WATERSHED NAME: Chain Lakes Area	HUC: 1701030140
TRIBUTARY: Blue Lake Creek (middle)	HUC: 170103014002

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Sediment yield (%)	126	126	126	133	126	126	126
Peak flow (%)	4	4	4	4	4	4	4
Net stream crossings (#)	0	-25	-25	-23	-25	0	-25
Net associated risk (tons/year)	0	-105	-105	-104	-105	0	-105
Net roads (miles)	0	-9	-9	-8	-9	0	-9
Net encroaching road (miles)	0	-.5	-.5	-.5	-.5	0	-.5

Note: The sediment yield and peak flow change estimates in the table represent the cumulative expected responses as a result of forest management activities over time and throughout the watershed represented. The estimates assume standard BMPs and Soil and Water Conservation Practices are employed. The four "net change" lines in the table are an accounting of the driving disturbance and restoration elements in this project. When non-standard site-specific BMPs and restoration practices associated with these alternative are incorporated into the analyses, the synthesis of these analyses yields the conclusions of cumulative, direct, and indirect effects that follow. An explanation of each measure of change displayed in the table is provided under "Methodology" at the beginning of the Environmental Consequences for Watershed, above.

The direct and indirect effects from canopy removal at localized sites in all alternatives may be that snow accumulations and melt rates are altered. Some change in timing, and increases in the magnitude and quantity of flow is expected under all alternatives at this scale. The increase in flow is primarily due to the mortality of trees caused by the Douglas-fir beetle. Additional mortality due to harvest of green trees is not expected to be a measurable increase in magnitude or quantity of flows. No measurable differences are expected to occur between any of the alternatives. No measurable effects are expected to stream channel conditions.

Bumblebee Analysis Area

The effects assessments in this section involve the project analysis areas in the North Fork of the Coeur d'Alene River sub-basin.

Cumulative Effects

All of the proposed activities would occur in a contiguous area along the face of the Little North Fork of the Coeur d'Alene River. None are proposed in the Bumblebee Creek drainage itself. The face drainages with proposed management drain directly into the Little North Fork of the Coeur d'Alene River, which is listed as a Water Quality Limited Stream. The cumulative effects analysis area extends from the headwaters of these face drainages to their outlet into the North Fork of the Coeur d'Alene river. No measurable cumulative effects would occur at the scale of the main river. Effects from the mortality of trees, road construction, and reconstruction would be distributed over several smaller tributaries. Cumulative effects to the small face drainages would include an estimated increase in sediment yield (2%) from the planned road construction and reconstruction under Alternatives B, D, and E. The pollutant of concern (sediment) that has caused the Little North Fork to be listed as a Water Quality Limited Stream could be measurably increased in affected tributaries, but would not cause measurable cumulative effects increases in the Little North Fork itself.

Table III-60. Projected watershed response in the Bumblebee Creek Area (Little North Fork Coeur d'Alene River) Watershed, by alternative.

WATERSHED NAME: Bumblebee Area (Little NF Coeur d'Alene River)	HUC: 170103030201
TRIBUTARY: Bumblebee Creek	HUC: 170103030201

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Sediment yield (%)	242	244	242	244	244	242	242
Peak flow (%)	7	7	7	7	7	7	7
Net stream crossings (#)	0	+9	+8	+9	+9	0	-7
Net associated risk (tons/year)	0	-11	-12	-11	-11	0	-32
Net roads (miles)	0	+1	0	+1	+1	0	-3.5
Net encroaching road (miles)	0	0	0	0	0	0	-1.2

Note: The sediment yield and peak flow change estimates in the table represent the cumulative expected responses as a result of forest management activities over time and throughout the watershed represented. The estimates assume standard BMPs and Soil and Water Conservation Practices are employed. The four "net change" lines in the table are an accounting of the driving disturbance and restoration elements in this project. When non-standard site-specific BMPs and restoration practices associated with these alternative are incorporated into the analyses, the synthesis of these analyses yields the conclusions of cumulative, direct, and indirect effects that follow. An explanation of each measure of change displayed in the table is provided under "Methodology" at the beginning of the Environmental Consequences for Watershed, above.

Direct and Indirect Effects at the Tributary and Localized Scales

Measurable direct and indirect effects to stream condition and hillslope hydrology could occur in three small tributaries associated with approximately 2.5 miles of road reconstruction under Alternatives B, C, D, and E. In addition, Alternatives B, D, and E also contain approximately 1 mile of new temporary road construction. The short-term increase in sediment could be measurable at the tributary scale. BMP implementation would reduce the impacts. The other action Alternatives (A, C, F and G) would not increase projected sediment yields in the Bumblebee area, but neither do they promote recovery. Culvert upgrades in Little Bumblebee Creek would reduce net sediment risk for the analysis area by approximately 11 tons per year in Alternatives B through F, but this would not affect potential impacts in the three small tributaries discussed above. The obliteration of the 796 road in Bumblebee Creek (Alternative G), which lies outside of the timber sale boundaries, is the only substantial restoration opportunity in the Bumblebee area. Potential management impacts in Alternatives B through F would outweigh improvement benefits because of limited restoration opportunities in the area.

The direct and indirect effects of canopy removal at localized sites under all alternatives may be that snow accumulations and melt rates are altered. Some change in timing, and increases in the magnitude and quantity of flow is expected under all alternatives at this scale. The increase in flow is primarily due to the mortality of trees caused by the Douglas-fir beetle. Additional mortality due to harvest of green trees is not expected to be a measurable increase in magnitude or quantity of flows. No measurable differences are expected to occur between any alternatives. No measurable effects are expected to stream channel conditions.

Steamboat Creek Analysis Area

Cumulative Effects

The cumulative effects analysis area in Steamboat Creek Watershed extends from the headwaters to the North Fork of the Coeur d'Alene River. No short- or long-term effects to beneficial uses are expected at the watershed scale. No apparent changes in sediment yields or peak flows are anticipated under any of the alternatives. There would be no direct or indirect or cumulative effects on the timing, magnitude or quantity of flow under any alternative. Local or watershed-scale changes in flood frequency would not be measurable or affect either the stream or channel structure at this scale. Alterations in hillslope processes would not affect values or beneficial

uses at the watershed scale. Net reductions in sediment from removing road channel crossings and road miles would not be measurable at this scale.

Cumulatively, there would be no measurable short- or long-term effects to stream condition, hillslope hydrology, or fisheries habitat. Short-term increases in fine sediment would occur in localized areas immediately following new road construction and reconstruction of existing roads in certain tributaries, however, the majority of the sediment would be controlled with the implementation of Best Management Practices. No adverse effects to beneficial uses are expected. Risk of future sediment loading, primarily at the road channel crossings, would be reduced with planned watershed improvement activities. The pollutant of concern (sediment) that has caused Steamboat Creek to be listed as a Water Quality Limited Stream would not be increased. In fact, slight short- and long-term reduction of sediment would occur.

Given the slight risk associated with the developments proposed and the inconsequential extent of associated restoration, none of the alternatives substantively support the watershed and water resources portion of the project's purpose and need to tangibly improve conditions of the watersheds.

Table III-61. Projected watershed response in the Steamboat Creek Watershed, by alternative.

WATERSHED NAME: Steamboat Creek Watershed	HUC: 1701030109
TRIBUTARY: Steamboat Creek	HUC: 1701030109

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Sediment yield (%)	202	202	202	202	202	202	202
Peak flow (%)	6	6	6	6	6	6	6
Net stream crossings (#)	0	-7	-7	-7	-7	0	-7
Net associated risk (tons/year)	0	-14	-14	-14	-14	0	-43
Net roads (miles)	0	-3	-4	-3	-3	0	-4
Net encroaching road (miles)	0	0	0	0	0	0	0

Note: The sediment yield and peak flow change estimates in the table represent the cumulative expected responses as a result of forest management activities over time and throughout the watershed represented. The estimates assume standard BMPs and Soil and Water Conservation Practices are employed. The four "net change" lines in the table are an accounting of the driving disturbance and restoration elements in this project. When non-standard site-specific BMPs and restoration practices associated with these alternative are incorporated into the analyses, the synthesis of these analyses yields the conclusions of cumulative, direct, and indirect effects that follow. An explanation of each measure of change displayed in the table is provided under "Methodology" at the beginning of the Environmental Consequences for Watershed, above.

Direct and Indirect Effects at the Tributary and Localized Scales

At the tributary scale, no direct or indirect effects to beneficial uses are anticipated from harvest activities under any of the alternatives, including the No-Action Alternative. The short-term increase in sediment estimated by the model under Alternative B, D, and E would not be measurable at the tributary scale. The implementation of Best Management Practices (BMPs) and adherence with the Inland Native Fish Strategy would provide protection for riparian habitat and control the majority of the sediment associated with these activities. The sediment yield and peak flow estimates in the table represent the cumulative expected responses based on forest development activities over time throughout the watershed. The estimates assume standard BMPs and Soil and Water Conservation Practices.

Sediment reductions would be associated with the net reduction in stream channel crossings and road miles under all of the alternatives except Alternatives A and F. The direct effect of this work would be a short-term introduction of fine sediment at localized sites, which would not be expected to adversely affect channel conditions and fish habitat. Other direct effects include reductions in the contributing area and in the risk for channel crossing failure. A small reduction in the contributing area might trend the localized tributaries towards reduced peak flows. Removing culverts eliminates flow constriction, which reduces flow velocities at local sites.

Indirect effects of the watershed improvement work includes decreasing fine sediment and bedload sources, increasing flood-prone area, decreasing risks of catastrophic channel failures and increasing the stream's ability to dynamically adjust to flows and sediment. At this scale in the watershed, this would provide a gradual decline in sediment routing downstream which would provide improved conditions for beneficial uses.

No tractor logging on sensitive landtypes will occur in any of the alternatives. Approximately 0.4 miles of new road (system and temporary) would be constructed on sensitive landtypes in alternatives B, D and E . The direct effect of new road construction adjacent to small 1st order streams would include the delivery of sediment at localized sites, but no measurable indirect effects to streams due to the implementation of riparian buffers and BMP's. In addition, featured watershed restoration under all of the action alternatives except Alternative F includes the obliteration of approximately .3 miles of roads and channel crossings on sensitive landtypes.

The direct and indirect effects of canopy removal at localized sites under all alternatives would be altered snow accumulation patterns and melt rates. Some change in timing, and increases in the magnitude and quantity of flow would occur under all alternatives at individual sites. The increase in flow would be primarily due to the mortality of trees from the Douglas-fir beetle. Additional mortality due to harvest of green trees would not result in a measurable increase in magnitude or quantity of flows for any of the alternatives. No measurable effects would occur in stream channel conditions.

The cumulative effects from management activities most likely would not be discernible at this scale for increases in peak flows or sediment over what would occur under the No-Action Alternative. Cumulative benefits at the tributary scale with the amount of watershed improvement planned would most likely not be discernible at this scale either. More detailed information is available in the watershed reports in the project files.

Table III-62. Projected watershed response in the Lower Steamboat Tributary of the Steamboat Creek Watershed, by alternative.

WATERSHED NAME: Steamboat Creek Watershed	HUC: 1701030109
TRIBUTARY: Lower Steamboat Creek	HUC: 170103010903

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Sediment yield (%)	163	168	163	168	168	163	163
Peak flow (%)	5	5	5	5	5	5	5
Net stream crossings (#)	0	-7	-7	-7	-7	0	-7
Net associated risk (tons/year)	0	-14	-14	-14	-14	0	-43
Net roads (miles)	0	-3	-3	-3	-3	0	-3
Net encroaching road (miles)	0	0	0	0	0	0	0

Note: The sediment yield and peak flow change estimates in the table represent the cumulative expected responses as a result of forest management activities over time and throughout the watershed represented. The estimates assume standard BMPs and Soil and Water Conservation Practices are employed. The four "net change" lines in the table are an accounting of the driving disturbance and restoration elements in this project. When non-standard site-specific BMPs and restoration practices associated with these alternative are incorporated into the analyses, the synthesis of these analyses yields the conclusions of cumulative, direct, and indirect effects that follow. An explanation of each measure of change displayed in the table is provided under "Methodology" at the beginning of the Environmental Consequences for Watershed, above.

Hart Analysis Area

The effects assessments in this section involve the project analysis areas north of the Coeur d'Alene River sub-basin, the Hart Watershed Area and the Beaver Creek watershed. All streams are tributaries to the North Fork of the Coeur d'Alene River which is listed as Water Quality Limited because of sediment.

Hart Watershed

Cumulative Effects

The Hart cumulative effects analysis area is comprised of a series of contiguous face drainages to the North Fork of the Coeur d'Alene River and Beaver Creek including Brown Creek, Hopkins Creek, Trouble Creek, Little Grizzly Creek, and Trail Creek. For the purposes of analysis, the Hart area was separated into two cumulative effects areas, Beaver Creek and the face drainages of the North Fork of the Coeur d'Alene river. Only the Hart area will be discussed in this section. The cumulative effects analysis area extends from the headwaters of the face drainages to their outlet into the North Fork of the Coeur d'Alene River. No measurable cumulative effects would occur at the scale of the main river.

No short- or long-term cumulative effects to beneficial uses would occur at the watershed scale. There would be no predicted increases in peak flows under any of the alternatives, but a short-term increase in sediment is predicted under Alternatives B, D, and E. A source of sediment is related to a section of temporary road (942-2T). This section would be located near the ridge above the emergence of perennial or intermittent streams and on a landtype that is low risk for mass erosion and delivery potential. Local or watershed-scale changes in flood frequency would not be measurable at this scale. Alterations in hillslope processes would not affect values or beneficial uses. Net reductions in sediment from a decreasing road channel crossings under Alternative G would not be measurable at this scale.

Table III-63. Projected watershed response in the Hart Area Tributary of the Hart Area Watershed, by alternative.

WATERSHED NAME: Hart Area	HUC: 1701030301
TRIBUTARY: Hart Area	HUC: 1701030301

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Sediment yield (%)	108	109	108	109	109	108	108
Peak flow (%)	2	2	2	2	2	2	2
Net stream crossings (#)	0	+2	0	+2	+2	0	-12
Net associated risk (tons/year)	0	+2	0	+2	+2	0	-45
Net roads (miles)	0	+1	0	+1	+1	0	-7
Net encroaching road (miles)	0	0	0	0	0	0	0

Note: The sediment yield and peak flow change estimates in the table represent the cumulative expected responses as a result of forest management activities over time and throughout the watershed represented. The estimates assume standard BMPs and Soil and Water Conservation Practices are employed. The four "net change" lines in the table are an accounting of the driving disturbance and restoration elements in this project. When non-standard site-specific BMPs and restoration practices associated with these alternative are incorporated into the analyses, the synthesis of these analyses yields the conclusions of cumulative, direct, and indirect effects that follow. An explanation of each measure of change displayed in the table is provided under "Methodology" at the beginning of the Environmental Consequences for Watershed, above.

Direct and Indirect Effects at the Tributary and Localized Scales

The proposed management activities in the Hart Area occur in Brown Creek and two small face drainages. These drainages are widely spaced and evenly distributed across the Hart area. At the tributary scale, no direct or indirect effects to beneficial uses would occur from management activities under any of the alternatives. Alternatives B, D, and E have the potential for short-term sediment increases associated with road construction

and reconstruction. BMP implementation and adherence to the Inland Native Fish Strategy would provide protection for the riparian areas. The cumulative effects from management activities would not be measurable at the tributary scale for increases in peak flows or sediment over what would occur under the No-Action Alternative. Cumulative benefits at the tributary scale with the amount of watershed improvement planned would not be measurable at this scale either. More detailed information is available in the project files ("Watershed").

At localized sites, sediment inputs would occur in areas of new road construction and road reconstruction that are in close proximity to stream channels. Implementing Best Management Practices would reduce sediment inputs at these localized sites. Where culverts are being installed they would be engineered to meet 100-year flood events reducing the risk for failure. Some localized sediment contribution can be expected, but most likely would not be measurable.

Of particular concern is the construction of temporary road 942-2T, which would cross a swale high on the slope above the North Fork of the Coeur d'Alene River. The swale probably only carries ephemeral water following intense thunder storms or rapid snowmelt. It is not likely to carry eroded materials downslope to live water or the river. However, to assure that the project in the Hart Area will not contribute to the pollutant that caused the North Fork to be listed as a Water Quality Limited Stream, the road would be located as high on the slope as necessary to avoid any stream with established bed and banks and a sediment control device will be installed prior to pioneering that will capture materials eroded by the construction. Devices that will achieve this criteria include silt fences, slash filter windrows, and secured baled straw or hay. The location of these devices must begin at the beginning of any approach to a crossing site.

Due to low levels of proposed harvest and the lack of restoration opportunities in the Hart Area, there are no substantial benefits or effects associated with Alternatives B through F. Considerable watershed improvement work would occur only under Alternative G. The direct effect of this work would be a short-term introduction of fine sediment at localized sites (primarily turbidity) which would not adversely affect channel conditions and fish habitat. Direct effects include reducing risk for failure of these crossings by eliminating flow constrictions, reducing local velocities of flow, and increasing the stream's ability to access its flood-prone area. Continual and potential sediment sources would be reduced, channel conditions at localized sites would be returned to a more natural state. Peak flows may be decreased by reducing the channel network and stream channels contributing area.

Indirect effects of the watershed improvement work include decreasing fine sediment and bedload sources, increasing flood-prone area, decreasing risks of catastrophic channel failures, and increasing the stream's ability to dynamically adjust to flows and sediment. A gradual decline in downstream sediment routing would result, providing improved conditions for beneficial uses.

The direct and indirect effects of canopy removal at localized sites under all alternatives may be that snow accumulations and melt rates are altered. Some change in timing, and increases in the magnitude and quantity of flow is expected under all alternatives at this scale. The increase in flow is primarily due to the mortality of trees caused by the Douglas-fir beetle. Additional mortality due to harvest of green trees is not expected to be a measurable increase in magnitude or quantity of flows. No measurable differences are expected to occur between any alternatives. No measurable effects are expected to stream channel conditions.

Beaver Creek Watershed

Cumulative Effects

The lower portion of the Beaver Creek Watershed is part of the Hart Analysis Area. For the purposes of watershed-level analysis, the Hart Analysis Area was divided into two parts; the Beaver Creek Watershed was analyzed separately from a group of small, independent face drainages along the North Fork of the Coeur d'Alene river. This section addresses only the Beaver Creek watershed. The cumulative effects analysis area

extends from the headwaters of Beaver Creek to its outlet into the North Fork of the Coeur d'Alene River. No measurable cumulative effects would occur beyond this point.

No short- or long-term effects to beneficial uses would occur at the watershed scale from the project. The Beaver Creek watershed has been intensively managed in the past. The estimated sediment yield under the No-Action Alternative is 113% over predicted unmanaged conditions, and peakflows are an estimated 5% over unmanaged conditions. A short-term increase in sediment and peak flows would be anticipated under all alternatives except Alternatives C and G. Watershed models estimate there would be an increase in peakflow of 1% under the proposed action alternatives, but this would not result in measurable direct, indirect or cumulative effects on the timing, magnitude or quantity of flow at the watershed scale. Local or watershed scale changes in flood frequency would not be measurable or affect either the stream or channel structure at this scale. Alterations in hillslope processes would not affect values or beneficial uses at the watershed scale. Reduction in sediment risk of an estimated 37 tons per year under Alternative A from the removal of road channel crossings, road miles, and encroaching sections of road would not be measurable at the watershed scale.

Table III-64. Projected watershed response in the Beaver Creek Tributary of the Hart Area Watershed, by alternative.

WATERSHED NAME: Beaver Creek Watershed	HUC: 1701030130
TRIBUTARY: Beaver Creek	HUC: 1701030130

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Sediment yield (%)	113	114	113	119	114	114	113
Peak flow (%)	5	6	6	6	6	6	5
Net stream crossings (#)	-40	-40	-40	-39	-40	-40	-40
Net associated risk (tons/year)	-36.6	-93.6	-95.7	-92.5	-93.6	-93.6	-95.1
Net roads (miles)	-27	-25	-27	-23	-25	-25	-27
Net encroaching road (miles)	0	0	0	0	0	0	0

Direct and Indirect Effects at the Tributary and Localized Scales

No direct effects to beneficial uses would occur from harvest activities and road construction or reconstruction in any of the action alternatives at the tributary scale. Under Alternatives B, D, E and F, a short-term response to increased sediment associated with road construction and reconstruction would occur. Implementation of Best Management Practices and standards and guidelines of the Inland Native Fish Strategy would provide protection to riparian habitat. Short-term increases in peak flow would also occur in small localized drainages, but these increases would not adversely affect channel condition at the tributary scale.

Under Alternative A, sediment input to streams would decrease due to fewer channel crossings and miles of road as a result of previously-planned and funded projects. Culvert upgrades under all action alternatives would further reduce sediment input to the streams. The direct effect of improvement work would be a short-term introduction of fine sediment at localized sites (primarily turbidity) which would not adversely affect channel conditions or fish habitat. Other direct effects include reducing risk for failure of these crossings by eliminating flow restrictions, reducing local velocities of flow, and increasing the stream's ability to access its floodplain.

Indirect effects of watershed improvement would include decreasing fine sediment and bedload sources, increasing the stream's ability to access its floodplain, decreasing risks of catastrophic channel failures, and increasing the stream's ability to adjust to flows and sediment. At the tributary scale,a gradual decline in downstream sediment routing would result, providing improved conditions for beneficial uses.

The cumulative effects from management activities most likely would not be discernible at the tributary scale for increases in peak flows or sediment over Alternative A. However, measurable cumulative benefits at the

tributary scale could result from the reduction of sediment, improved stream conditions and water quality in tributaries and localized reaches. More detailed information is available in the watershed reports in the Project Files.

Under all alternatives, the direct effects from canopy removal at localized sites may include altered snow accumulations and melt rates. Indirect effects could include localized increases in peak flows. The direct effect of removing road channel crossings would be a short-term introduction of fine sediment, observable for a short distance below the work. Other direct effects include reducing the risk for failure of these crossings, reducing local flow velocities and erosion, and increasing the stream's ability to access its floodplain. Removing road channel crossings under all action alternatives would indirectly improve overall watershed conditions by reducing sediment sources, returning site conditions to a more natural state.

Cumulative Effects at the Coeur d'Alene River Ranger District Project Area Scale

The project area is widely distributed over three of the six sub-basins that make up the Coeur d'Alene Lake Basin. All alternatives provide watershed restoration improvements in local watersheds. Substantial improvements will be realized in the action alternatives, especially Alternatives B, C, D, E, and G. However due to the wide and dispersed nature of the improvements, from the overall perspective of the project area, the cumulative effects of all the improvements will remain evident only within the local watersheds.

Local water quality will be enhanced; but no measurable response will be recognizable in the large rivers or the lake. Similarly, there will be no direct or indirect effects at this scale.

Table III-65. Watershed Summary for the Coeur d'Alene Project Area, by alternative.

WATERSHED NAME: Coeur d'Alene Analysis Area	HUC: 170103 -01 -03 -04 and -05

Measure of Change	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Net stream crossings (#)	-140	-236	-250	-255	-236	-200	-365
Net associated risk (tons/year)	-426	-1,251	-1,267	-1,343	-1,151	-926	-1,650
Net roads (miles)	-75	-135	-142	-142	-135	-110	-196
Net encroaching road (miles)	-0.3	-4.7	-4.7	-4.7	-4.7	-3	-8.9

Note: The four "net change" lines in the table are an accounting of the driving disturbance and restoration elements in this project. When non-standard site-specific BMPs and restoration practices associated with these alternative are incorporated into the analyses, the synthesis of these analyses yields the conclusions of cumulative, direct, and indirect effects that follow. An explanation of each measure of change displayed in the table is provided under "Methodology" at the beginning of the Environmental Consequences for Watershed, above.

Effects of Opportunities

Timber Stand Improvement

If timber stand improvement opportunities are implemented, no consequential effects would occur to hillslope processes; timing, magnitude, or quantity of flows; or stream channel processes.

Noxious Weeds

If noxious weed control opportunities are implemented, no consequential effects would occur to hillslope processes; timing, magnitude, or quantity of flows; or stream channel processes.

Watershed and Wildlife Restoration

Direct Effects

Hillslope Processes: Road obliteration would decrease compaction and increase productivity. The removal or upgrade of culverts would input sediment directly into streams. In larger streams, the sediment would not be measurable in comparison to natural sediment transport rates. In smaller channels, localized deposition of fine sediment would occur until streams have the energy to redistribute the sediment down stream (such as annual spring runoff).

Timing, Magnitude, and Quantity of Flows: Obliterated roads would be treated to eliminate the increase of flow contribution from roads to streams. A reduction in the quantity and timing of peak flows would be expected in headwater basins. Some measurable decrease would be expected within larger stream systems.

Stream Channel Processes: Some changes would occur to stream channel processes. Some road segments would be removed that are encroaching on the floodplain. This would trend affected floodplains towards natural function during flood events, and reduce the risk of road failure at these locations.

Indirect Effects

Hillslope Processes: Road obliteration would improve the stability of some road segments. All road obliterated segments would have fills removed where mass failure would be likely to occur. Indirect sediment input to streams would increase under all action alternatives while activities are implemented. In larger streams, the sediment would not be measurable in comparison to natural sediment transport rates. In smaller channels, localized deposition of fine sediment would occur until streams have the energy to redistribute the sediment down stream (such as annual spring runoff). Stream crossings that are removed would reduce long-term sediment delivery risk by removing fills from stream channels. Stream channels and habitats locally and downstream of project areas would be subject to substantially less risk of sedimentation and channel failure.

Timing, Magnitude, and Quantity of Flows: No measurable effect would occur to perennial streams. Harvest of live trees is unlikely to change flows during rain-on-snow events.

Stream Channel Processes: Stream channels and habitats locally and downstream of restoration areas would be subject to substantially less risk of sedimentation and channel failure. Local trends of improvement of stream condition would be rapidly established. Reduction in the risk of road and stream crossing failure would reduce the occurrence of mass input of sediment into channels during large climatic events, such as the rain-on-snow events that occurred during 1995-96.

Cumulative Effects

Hillslope Processes: No cumulative effects would be expected to alter hillslope function.

Timing, Magnitude, and Quantity of Flows: The cumulative effects of implementing watershed and wildlife restoration projects could decrease the quantity and timing of peak flows in some stream systems.

Stream Channel Processes: Stream channel conditions would improve if watershed and wildlife opportunities are implemented.

Water Quality: Short-term increases in sediment would occur in localized areas. Some improvement to water quality would occur downstream of improvement projects.

Consistency With the Forest Plan and Other Applicable Regulatory Direction

Protect water quality per the Clean Water Act and to meet or exceed States' Water Quality Standards: The Forest Service has agreements with the States to implement Best Management Practices (BMP) or Soil and Water Conservation Practices for all management activities to meet the objectives for Forest Practices . Monitoring would be designed to demonstrate the implementation of BMPs and provide feedback concerning their effectiveness in protecting water quality. Watershed conditions that contribute to water quality that is impaired would be improved through restoration projects and through scheduling of timber harvest and road building activities.

Riparian areas would be managed to meet objectives for riparian-dependent resources (fish and wildlife habitats, water quality, stream channel integrity, vegetation, public water supplies).

Inland Native Fish Strategy: The Inland Native Fish Strategy has been implemented as amendments to the Forest Plans of the Idaho Panhandle and Colville National Forests. All action alternatives would be consistent with this direction. The amendments require mitigation of environmental effects of management decisions. Specified riparian management goals and objectives have been developed, and Riparian Habitat Conservation Areas (RHCA) are defined and delineated. Riparian management and Riparian Management Objectives (RMO) are addressed using site-specific analysis and supportive data, and watershed analyses. The strategy also specifies standards and guidelines which must be applied for certain activities in RHCAs. These are incorporated into the action alternatives as specified in Chapter II.

Clean Water Act and Water Quality Limited §303(d) Listings

Under authority of the Clean Water Act, the EPA and the States must develop plans and objectives (TMDLs) that will eventually restore listed stream segments. In lieu of those plans, Forest Service will demonstrate or find that their actions will not result in a net substantial increase in the pollutant of concern or prohibit or delay potential recovery (IDHW, 1997; USFS, 1995).

Alternatives A, B, C and E would be consistent with the Clean Water Act and Water Quality Limited Listings.

Alternatives D and F, as designed, would not be consistent or would be marginally consistent with the Clean Water Act and Water Quality Limited Listings in Bumblebee Area and Steamboat Creek.

SOIL PRODUCTIVITY

CHANGES BETWEEN THE DRAFT AND FINAL EIS

Due to public comments and additional analysis that was completed, a section was added for Soil Productivity that was not written for the Draft EIS.

REGULATORY FRAMEWORK

The regulatory framework providing direction for protecting a site's inherent capacity to grow vegetation comes from the following principle sources:

- *The Multiple Use-Sustained Yield Act of 1960,*
- *The National Forest Management Act of 1976 (NFMA),*
- *The Code of Federal Regulations for Forest Planning (36, CFR 200.1),*
- *The Forest Plan and Regional Soil Quality Standards (FSH 2509.18)*

The Multiple Use-Sustained Yield Act of 1960 directs the Forest Service to achieve and maintain outputs of various renewable resources in perpetuity without permanent impairment of the land's productivity.

Section 6 of the National Forest Management Act of 1976 (NFMA) charges the Secretary of Agriculture with ensuring research and continuous monitoring of each management system to safeguard the land's productivity.

The Code of Federal Regulations for Forest Planning that followed NFMA requires the Forest Service to measure effects of prescriptions, including "significant changes in land productivity"(Code of Federal Regulations 36, CFR Part 200, Section 1, 1987).

To comply with NFMA, the Chief of the Forest Service has charged each Forest Service Region with developing soil quality standards for detecting soil disturbances indicating a loss in long-term productive potential. These standards and guidelines are built into Forest Plans.

AFFECTED ENVIRONMENT

Soil productivity is the output of a specified plant or group of plants under a defined set of management practices, or total plant mass produced annually per unit area.

The most productive part of the project area's soils occurs near the surface at the contact between the forest litter and the mineral soil. Here the litter has been highly decomposed into dark colored amorphous material which is the richest and most productive part of the soil. This layer is frequently only a few inches thick but its presence is much more important than its thickness would indicate. This organic matter rich layer contains most of the soil nitrogen, potassium and mycorrhizae which must be present for a site to be productive.

Below this organic horizon is volcanic ash which occurs at the surface layer of the mineral soil. In north Idaho, the ash layer is typically 16 inches thick, ranging between 7 and 24 inches on most sites. The top part of the ash is usually enriched in organic matter which also contributes nitrogen, potassium and mycorrhizae to this part of the soil. The lower part of the volcanic ash has less organic matter and is not as fertile as the upper part. The ash has a high water holding capacity and nutrient holding capacity both of which are important for soil productivity.

Below the volcanic ash, the subsoils and substratum tend to be coarse textured in the granitic soils and medium textured in the Belt, metasedimentary soils. These subsoil and substratum materials are very weakly weathered. They tend to have a high component of rock fragments, although, this can be quite variable, particularly in the alluvial bottoms and outwash materials.

Most of the productivity of all project area soils is found near the soil surface.. This is also the part of the soil that is easiest to disturb by management activities. The soils of this project area are generally rated low to moderate in productivity potential.

A more detailed description of the geomorphology, soils, erosion processes and soil productivity can be found in the draft soil map unit descriptions and a soil characterization for the Coeur d' Alene basin. These documents are included in the project file.

The Coeur d' Alene Project Area has proposed harvest units which range from 133 proposed units in Alternative F to 279 proposed units in Alternative D. The following existing conditions occur within some of the proposed project area: 16 units (780 acres) were tractor logged and 32 units (3,642 acres) were a combination of cable and tractor logged; 53 units (3,351 acres) were cable or aerial logged; the remaining units did not have any apparent harvest activity, but about half of these unlogged units have roads through or adjacent to the unit. Most of the cable units were logged using an Idaho jammer cable system which requires roads at close spacings.

Thirteen existing harvest units, presently being proposed for additional harvest activity have detrimentally disturbed soils that may exceed compaction and displacement soil quality standards by 1 to 20 percent: five of these 13 units (102 acres) were tractor harvested; two units (59 acres) are a combination cable/tractor harvest; six units (93 acre) were cable harvest. Total acres that do not meet the Forest Plan soil quality standards is 254 acres; these acres were harvested prior to the development of the 1987 Forest Plan.

Twenty-four other existing units (1231 acres) are marginal (within five percent of possibly not meeting Forest Plan soil quality standards): six of these units (270 acres) were tractor harvested; eleven units (849 acres) are a combination cable/tractor harvest; and seven units (112 acres) were cable harvest.

Additional units with past harvest history had detrimentally disturbed soils that ranged from 1 to 14 percent. Data for all of the above units are in spreadsheets which are in the project files.

In summary, 13 units (254 acres), which were harvested prior to the development of the 1987 Forest Plan, presently may not meet Forest Plan soil quality standards and 24 units (1231 acres) are marginal.

Of the 279 proposed harvest units, 114 units (6,550 acres) occur on low potassium soils.

ENVIRONMENTAL CONSEQUENCES

Methodology

In order to demonstrate that the Forest Plan standard would be achieved with the alternative as proposed; and to identify specific proposed units that would require design modifications or site specific practices to achieve the standard; a systematic procedure was established to identify the existing condition of each proposed unit in terms of the detrimentally disturbed soils standard, low potassium and those units that are at risk of not meeting the standard.

A spreadsheet was developed which lists all proposed treatment units in each alternative; the existing condition for those units, include acres of constructed or designated trails, roads (permanent or temporary) within or adjacent; landings within or adjacent; logging, slashing, yarding systems and areas of severe burning. These activities were compiled in this spreadsheet from aerial photos and from timber stand and road data bases. The spreadsheet was designed to calculate the detrimentally disturbed area of each activity area. The coefficients for these calculations came from Forest soil monitoring data. Monitoring data exists for each type of harvest and slash disposal systems represented on the proposed project units that have had harvest and slash treatment activities. The average percentage of detrimentally disturbed soils obtained from transects of past monitoring for the appropriate harvest or slash treatment were applied to existing units.

This monitoring information is contained in the Forest Plan Monitoring and Evaluation Reports (1988 through 1993 and 1997) which are on file in the Forest Supervisor's Office of the Idaho Panhandle National Forests.

A second spreadsheet contains all the proposed actions by alternative. These actions were compared to the existing condition and the mitigation measures common to all action alternatives to evaluate where each unit roughly stands in relation to the Forest Plan standards. Units that exceed or nearly exceed standards would follow specific soil mitigation measures common to all alternatives listed in chapter II.

To determine low potassium, a map of proposed project units was overlaid on a map of geologic formations to determine which units occurred on the Prichard and St. Regis geologic formations.

All spreadsheets can be found in the soils productivity portion of the project file.

The following three design and management criteria relate to soil productivity in the Douglas-fir Beetle Project:

1. Detrimentally disturbed soils within activity areas (harvest units).

All action alternatives would comply with Forest Plan Standards and Regional Soil Quality Standards (FSH 2509.18) related to detrimentally disturbed soils.

Compliance with these standards requires that at least 80 percent of an activity area (harvest unit and any adjacent roads or landings) must be in a condition of acceptable productivity for trees and other managed vegetation; that is, no more than 20 percent of an activity area may have detrimentally disturbed soils. This standard is based on the lowest magnitude of adverse change detectable, given current monitoring technology (Powers et al. 1990).

The soils in an activity area are considered detrimentally disturbed when the following soil conditions exist as a result of Forest practices.

A. Soil displacement results in the loss of either one inch of or half of the humus-enriched surface layer (A- soil horizon), whichever is less. The loss of the litter layer alone could be detrimental on some marginal sites. Displacement removes the most productive part of the soil resource. Roading, ground-based yarding, dozer piling and cable corridors are the major contributors to displacement.

B. Soil compaction results in a 20 percent or more increase in bulk density, or a 50 percent reduction in water infiltration rates typical for volcanic ash influenced surface soils. Soil compaction reduces the supply of air, water and nutrients to plants. Roading, ground based yarding and piling are the major contributors to compaction.

C. Fire consumes most woody debris and the entire duff and litter layer, exposing mineral soil. Burn ashes is white or reddish color, indicating that much of the carbon was oxidized by fire (Burned-Area

Emergency Rehabilitation Handbook FSH 2509.13). Burns which create very high temperatures at the soil surface when surface soil moisture content is low results in almost complete loss of surface and upper soil horizon organics. Many of the nutrients stored in these organics can be lost to the atmosphere through volitalization and removed from the site in fly-ash (Garrison and Moore, 1998).

2. Low Potassium Sites - Sites containing geologic formations that are naturally deficient in potassium bearing minerals.

This criteria relates to the natural deficiency of potassium (K) in the Prichard and St. Regis geologic formations. The Prichard and St. Regis geologic formations contain only traces of potassium feldspars. The other geologic formations that occur as part of the Belt Metasedimentary rocks have percentages of potassium feldspar within their mineral composition, that range from 2 to 12 percent (Harrison and Campbell, 1963). The majority of the beetle project area consists of Belt Metasedimentary geology. Unlike many other soil nutrients, potassium is derived almost entirely from the underlying rock formations. On some sites 45 percent of the potassium is held in trees, with the remainder being held in subordinate vegetation, forest floor and soil pools. Within the trees, about 85 percent of the potassium is held in the branches, twigs and foliage (Garrison and Moore, 1998). In most natural circumstances the potassium returns to the soil when the tree dies. If potassium is removed from the site, the loss is long-term. Whole tree yarding, removal of tree tops and grapple piling lead to the direct loss of potassium (Morris and Miller, 1994).

Some very preliminary research being done by the Intermountain Forest Tree Nutrition Cooperative (IFTNC) is showing a possible link to potassium deficiency and the lack of tree resistance to root rot. Most of the root rot concentrations within this beetle project area appear to be on the low potassium sites, this has not been tested, it is only an observation.

First year results from the seedling establishment/nutrition experiment conducted by the Intermountain Forest Tree Nutrition Cooperative showed that potassium was non-limiting from a tree growth standpoint on the Flat Creek Belt Metasedimentary site, (Garrison, 1998). This Belt Metasedimentary site is on the Striped Peak formation, and according to Harrison and Campbell contains about seven percent potassium feldspar in its mineral composition.

The Intermountain Forest Tree Nutrition Cooperative (IFTNC) is continuing to research potassium contents within tree species and different rock types in order to establish more definite minimum thresholds and affects on tree growth and resistance to root diseases. Until these minimum thresholds are developed through research, the Idaho Panhandle National Forest is using management recommendations from the IFTNC as a guideline for maintaining sufficient potassium on a site. The Forest is also planning to do tree foliar analysis in cooperation with the Tree Nutrition Cooperative this fall, in order to gather more information on forest potassium levels, if funding can be obtained.

The IFTNC has made the following management recommendations to retain the maximum practible potassium on site after logging:

A. *Practice conventional removal (lop and scatter) rather than whole-tree removal. The lop and scatter technique should be practiced during intermediate as well as final harvest operations.*
B. *Let slash remain on site over winter so mobile nutrients such as potassium can leach from fine materials back to the soil.*
C. *Light broadcast burn or underburn for release of potassium and other nutrients.*
D. *Avoid mechanical site preparation.*
E. *Plant species appropriate to site.*

In this project, we would use the recommendations of the IFTNC in the evaluation of alternatives.

3. Maintenance of large woody debris and organic matter.

The third soil productivity criteria common to all action alternatives relates to the management of coarse woody debris and organic matter which would follow the research guidelines contained in Graham et al., 1994.
The optimum level of fine organic matter is 21 to 30 percent and this equates to 1 to 2 inches of surface litter and humus. Optimum levels of fine organic matter relate to ectomycorrhizae fungus which form a strong and positive relationship. Ectomycorrhizae is a good indicator of a healthy forest soil. In moist western hemlock and cedar habitat types strong levels of ectomycorrhizae exists when organic levels exceed 30 percent. Soil survey data indicates that most forest sites have adequate organic matter levels to support strong ectomycorrhizae populations.

This soil productivity criteria is addressed as a mitigation requirement only and is not part of the alternative evaluations, because project alternatives are designed to meet the large woody debris guidelines.

Direct, Indirect and Cumulative Effects at the Analysis Area Scale

Direct and Indirect Effects

Soil productivity would not be compromised beyond Forest Plan soil quality standards for any alternative through the application of soil management requirements listed and described in chapter II.

Direct, indirect and cumulative impacts related to the alternatives of this project on soil productivity are typically at the site scale. Cumulative effects at a site are a function of past harvest methods and proposed harvest methods.

Detrimental soil disturbances such as compaction, displacement and possibly severe burning would increase on all action alternatives, except possibly Alternative G. Road building and tractor harvest units where additional designated skid trails are planned would receive the greatest amount of soil disturbance. Minor disturbances would occur on skyline and cable units and where fireline is constructed around units. Compaction, displacement and severe burning affect soil physical, chemical and biological properties which indirectly can affect the growth and health of trees and other plants.

On all action alternatives, harvesting trees and leaving the slash on site would remove the least amount of potassium and other essential nutrients off site. On the contrary, harvesting trees with the tops attached would remove the most. The significance of the potassium removal in relation to site productivity increases when harvest activities occur on low potassium sites, but measuring the effects on site productivity due to the loss of potassium cannot be predicted with certainty until more research information becomes available.

A positive affect occurs when the foliage and branches of harvested Douglas-fir trees are allowed to recycle on site, thereby, releasing stored nutrients, such as potassium and nitrogen back to the soil. Douglas-fir consumes and stores more potassium than most other trees. The release and availability of this stored potassium would benefit larch and western white pine, which require less potassium for growth and maintenance (Garrison and Moore, 1998). These more potassium efficient trees would be planted in all regeneration harvest units and favored within the improvement harvest units .

Effects of Alternative A (No Action)

A direct affect of bark beetle infestation is acceleration of tree mortality, increasing down organic matter and fuel loadings. In moist habitat sites, which make up approximately 85 percent of this project area, this increase in organic matter is a benefit to soil productivity. This response would be much less or could be a negative in dry habitat types which make up approximately 15 percent of this project area. Increased fuel

loading would increase the risk of soil damage (loss of organics, loss of nutrients, reduction of infiltration; this would substantially reduce the productivity of the site) in the event of high severity fires.

The thirteen proposed harvest units that presently have existing conditions that may not meet soil quality standards for detrimentally disturbed soils would remain adversely disturbed.

Increased fuel loadings on low potassium sites would increase the risk of potassium loss through fly ash removal in the event of high severity fires. If a high severity fire does not occur then potassium would stay on site and a positive effect similar to Alternative G would take place. The only difference is that in alternative G, potassium would be made available through low severity burning and in Alternative A, potassium would be released to the soil through decomposition.

Effects of Alternative B, C and E

Alternatives B, C and E propose to harvest and treat fuels on 10,231 acres. Proposed tractor logged acres are: alternative B, 1,182 acres; alternative C, 945 acres; and alternative E, 1,194 acres.

A direct affect of these management actions, particularly where road building occurs and on some of the tractor harvest units where additional designated skid trails are planned there would be an increase in detrimental soil disturbances such as compaction and displacement. Minor disturbances would occur on skyline and cable units and where fireline is constructed around units. Compaction, displacement and severe burning affect soil physical, chemical and biological properties which indirectly can affect the growth and health of trees and other plants.

On all sites including low potassium sites, except the units scheduled to be underburned, the fuel treatments planned are grapple piling or yarding of tops which would result in higher percentages of potassium contained within the tree being removed.

Alternative B, C and E propose 867, 867 and 373 acres of underburning respectively. Underburning on these acres would retain the maximum practible potassium on the site after logging and would meet the recommendations of the IFTNC.

Top attached yarding and grapple piling would amount to 9,275 and 89 acres respectively for Alternatives B and C and 9,858 acres of top attached yarding with no grapple piling in alternative E. On the yard top sites about 50 percent of the potassium containing foliage and branches would end up remaining on site in these areas, because in harvesting these dead and dying trees, the falling and skidding process would remove much of this material. The grapple piled sites would end up with more fines (potassium) removed off some areas and concentrated primarily on skidtrails for burning. The effects of yarding tops on low potassium sites would produce a great loss of potassium, but measuring the effects on site productivity cannot be done with certainty until more research information becomes available.

On the higher potassium content areas, the effects of yarding tops would again result in the greatest loss of potassium with the potential of reducing site productivity, again this is hard to predict with any certainty until more research information becomes available.

Alternatives B, C and E have eight of the thirteen proposed units (109 acres) where existing conditions presently may not meet Forest Plan soil quality standards and twenty-one of the twenty-four proposed units (1,114 acres) where existing conditions are marginal.

All of the proposed units that may not meet Forest Plan soil quality standards and the marginal units would follow the soil mitigation measures common to all action alternatives listed in Chapter 2. Upon implementation of the soil mitigation measures, these units would either maintain or reduce existing detrimental soil disturbance levels.

Where feasible, in harvest areas that presently may not meet Forest Plan standards, deep subsoiling with a winged subsoiler would be used on all non-dedicated landings and skid trails to decrease soil compaction and promote revegetation.

All tractor units that currently meet Forest Plan soil quality standards would incorporate the mitigation measures common to all action alternatives.

Effects of Alternative D

Alternative D proposes to harvest and treat fuels on 12,223 acres. Helicopter and skyline harvest systems are proposed on approximately 10,746 acres; and 1,477 acres are proposed to be tractor logged.

A direct affect of these management actions, particularly where road building occurs and on some of the tractor harvest units where additional designated skid trails are planned there would be an increase in detrimental soil disturbances such as compaction and displacement. Minor disturbances would occur on skyline and cable units and where fireline is constructed around units. Compaction, displacement and severe burning affect soil physical, chemical and biological properties which indirectly can affect the growth and health of trees and other plants.

On low potassium sites, harvesting on all sites would remove within the bole of a tree about 14 percent of the potassium that is contained within a tree, All slash would remain on site to allow potassium and other nutrients to leach into the soil. These sites would have the lowest loss of potassium and the lowest potential to reduce site productivity. A positive affect occurs when the foliage and branches of harvested Douglas-fir trees are allowed to recycle on site, thereby, releasing stored nutrients, such as potassium and nitrogen back to the soil. Douglas-fir consumes and stores more potassium than most other trees. The release and availability of this stored potassium would benefit larch and Western white pine, which require less potassium for growth and maintenance (Garrison and Moore, 1998). These more potassium efficient trees would be planted in all regeneration harvest units and favored within the improvement harvest units. On higher potassium content sites where fuel treatments require yarding of tops, the greatest loss of potassium would occur and the potential to reduce site productivity exists, but measuring the effects on site productivity cannot be done with certainty until more research information becomes available.

In this alternative 6,385 acres would receive underburning or " lop and scatter" fuel treatments. Both of these treatments would retain the maximum practible potassium on the site after logging. All low potassium acres would meet the recommendations of the IFTNC. The "lop and scatter" fuel treatment would increase fuel loadings which increases the risk of soil damage in the event of a wildfire. This increased fire risk situation would last about six to ten years which is the time needed to decompose the additional fine fuels.

On the higher potassium content areas, 90 acres would be grapple piled and 5,732 acres would have tops yarded. On the yard top sites about 50 percent of the potassium containing foliage and branches would end up remaining on site in these areas, because in harvesting these dead and dying trees, the falling and skidding process would remove much of this material. The grapple piled sites would end up with more fines removed (potassium) off some areas and concentrated primarily on skidtrails for burning.

Four of the thirteen proposed units (80 acres) where existing conditions presently may not meet Forest Plan soil quality standards and fifteen of the twenty-four proposed units (946 acres) where existing conditions are marginal are scheduled to be tractor logged. The remaining nine existing units that may not meet standards and the nine existing units that are marginal are scheduled to be skyline or helicopter logged from existing roads. All thirteen units that may not meet Forest Plan soil quality standard and the twenty-four that are marginal would follow the soil mitigation measures common to all action alternatives listed in Chapter 2. Upon implementation of the soil mitigation measures these units would either maintain or reduce existing detrimental soil disturbance levels.

Where feasible, in harvest areas that presently may not meet Forest Plan standards, deep subsoiling with a winged subsoiler would be used on all non-dedicated landings and skid trails to decrease soil compaction, promote revegetation and move these compacted sites back within meeting Forest Plan standards.

All tractor units that currently meet Forest Plan soil quality standard would incorporate the mitigation measures common to all action alternatives. Implementation of these mitigation measures would insure that Forest Plan soil quality standards are maintained.

Effects of Alternative F

Alternative F proposes to harvest and treat fuel on 8,036 acres. Helicopter and skyline harvest systems are proposed on 7,352 acres; and 684 acres are proposed to be tractor logged.

A direct affect of these management actions, particularly where road building occurs and on some of the tractor harvest units where additional designated skid trails are planned there would be an increase in detrimental soil disturbances such as compaction and displacement. Minor disturbances would occur on skyline and cable units and where fireline is constructed around units. Compaction, displacement and severe burning affect soil physical, chemical and biological properties which indirectly can affect the growth and health of trees and other plants.

On all sites including low potassium sites, except the units scheduled to be underburned, the fuel treatments planned are grapple piling or yarding of tops. Grapple piling and yarding tops on the low potassium sites would result in the greater loss of potassium and the highest potential to reduce site productivity exists, but measuring the effects on site productivity cannot be done with certainty until more research information becomes available.

In this alternative 5,400 acres would receive underburning fuel treatments. Underburning on these acres would retain the maximum practible potassium on the site after logging and would meet the recommendations of the IFTNC.

Top attached yarding and grapple piling would amount to 2,440 and 190 acres respectively. On the yard top sites about 50 percent of the potassium containing foliage and branches would end up remaining on site in these areas, because in harvesting these dead and dying trees, the falling and skidding process would remove much of this material. The grapple piled sites would end up with more fines (potassium) removed off some areas and concentrated primarily on skid trails for burning.

Alternative F has five of the thirteen proposed units (57 acres) where existing conditions presently may not meet Forest Plan soil quality standards and seventeen of the twenty-four proposed units (944 acres) where existing conditions are marginal.

All of the proposed units that may not meet Forest Plan soil quality standards and the marginal units would follow the soil mitigation measures common to all action alternatives listed in Chapter 2. Upon implementation of the soil mitigation measures these units would either maintain or reduce existing detrimental soil disturbance levels.

Where feasible, in harvest areas that presently may not meet Forest Plan standards, deep subsoiling with a winged subsoiler would be used on all non-dedicated landings and skid trails to decrease soil compaction and promote revegetation.

All tractor units that currently meet Forest Plan soil quality standard would incorporate the mitigation measures common to all action alternatives.

Effects of Alternative G

Alternative G, which proposes low intensity broadcast burns would have mostly positive effects by releasing potassium which is stored in organic materials and making it available for plant uptake Some minor loss of potassium would occur in fly ash during burning operations. Prescribed burning proposed for Alternative G is different from wildfires because wildfires generally are high intensity burns and occur when fuel moistures are much dryer. Wildfires have an overall negative effect because a large amount of potassium is lost through fly ash removal and increased soil heating would oxidize more soil organic matter. The mitigation measures in Chapter II would apply to all proposed burn units.

Cumulative Effects

Alternative A

Due to predicted high fuel loading, caused by recent Douglas-fir beetle activity, there is a risk of high severity wildfire that would consume soil organic matter. Such a fire, if it were to occur, would be predicted to have a moderate to high effect on soil nutrient and soil structure loss. This could result in reduced tree seedling establishment, tree growth and insect and disease resistance. If a high severity fire does not occur then potassium would stay on site and a positive effect similar to Alternative G would take place. The only difference is that in Alternative G, potassium is made available through low severity burning and in alternative A, potassium is released to the soil through decomposition.

Alternatives B, C and E

Roading, ground-based harvesting, slash removal, and cable corridors which operate outside of existing roads, cable corridors, or easily identifiable skid trails would increase the percentage of detrimental soil compaction and displacement on proposed harvest sites. Detrimental compaction is less likely to occur on some sites which have a high rock fragment content in the surface ash soil. In these alternatives eight proposed units currently may not meet Forest Plan soil quality standards and twenty-one are marginal. The cumulative impacts resulting from detrimental soil disturbance would be predicted to produce slower growing trees, somewhat less stand volume and possibly less resistance to root rot. Harvesting tree boles, grapple piling or yarding tops on low potassium sites and the yarding of tops and grapple piling on the higher potassium containing sites may produce less resistance to root rot. On all sites where management actions are planned and present conditions may not meet Forest Plan standards or are marginal, mitigation measures would be implemented to maintain or reduce existing detrimental soil disturbance levels.
Where more potassium efficient trees are planted or favored and where deep subsoiling of compacted soils occurs the above impacts would be predicted to be less.

Alternative B, C and E fall between Alternative D and F in relation to tractor logging acres. Alternatives B and C would have 89 acres of grapple piling, and 720 acres on Alternative E. Top yarding would be occur in alternatives B and C on 9,275 acres, with 9,858 occurring in Alternative E. These alternatives would not meet the recommendations of the IFTNC on the low potassium sites.

Alternative D

Roading, ground-based harvesting slash removal, and cable corridors which operate outside of existing roads, or easily identifiable skid trails would increase the percentage of detrimental soil compaction and displacement on proposed harvest sites. Detrimental compaction is less likely to occur on some sites which have a high rock fragment content in the surface ash soil. In this alternative thirteen proposed units currently may not meet Forest Plan soil quality standards and twenty-four are marginal. The cumulative impacts resulting from detrimental soil disturbance would be predicted to produce slower growing trees, somewhat less stand volume and possibly less resistance to root rot. Harvesting tree boles on low potassium sites and the yarding of tops and grapple piling on the higher potassium containing sites may produce less resistance

to root rot. On all sites where management actions are planned and present conditions may not meet Forest Plan standards or are marginal, mitigation measures would be implemented to maintain or reduce existing detrimental soil disturbance levels. Where more potassium efficient trees are planted or favored and where deep subsoiling of compacted soils occurs the above impacts would be predicted to be less.

Alternative D has the most acreage of tractor logging (1,477 acres). On the higher potassium containing sites 90 acres would be grapple piled and 5,732 acres would have tops yarded. This alternative would meet the recommendations of the IFTNC on all the low potassium sites and the Forest Plan standards.

Alternative F

Roading, ground-based harvesting, slash removal, and cable corridors which operate outside of existing roads, cable corridors, or easily identifiable skid trails would increase the percentage of detrimental soil compaction and displacement on proposed harvest sites. Detrimental compaction is less likely to occur on some sites which have a high rock fragment content in the surface ash soil. In this alternative five proposed units currently may not meet Forest Plan soil quality standards and seventeen are marginal. The cumulative impacts resulting from detrimental soil disturbance would be predicted to produce slower growing trees, somewhat less stand volume and possibly less resistance to root rot. Harvesting tree boles, grapple piling or yarding tops on low potassium sites and the yarding of tops and grapple piling on the higher potassium containing sites may produce less resistance to root rot. On all sites where management actions are planned and present conditions may not meet Forest Plan standards or are marginal, mitigation measures would be implemented to maintain or reduce existing detrimental soil disturbance levels. Where more potassium efficient trees are planted or favored and where deep subsoiling of compacted soils occurs the above impacts would be predicted to be less.

Alternative F has the lowest acreage of tractor logging (684 acres). Alternative F would have 190 acres of grapple piling and 2,440 acres where tops would be yarded. This alternative would not meet the recommendations of the IFTNC on some of the low potassium sites.

Alternative G

Alternative G would have a very small loss of potassium off site in the fly ash during burning. Only low intensity broadcast burning would occur in this alternative, so no further cumulative effects are anticipated.

Effects of Opportunities

Wildlife and Watershed Improvements: Road obliteration is the beginning of restoring the soil productivity on those sites by decompacting the soil and replacing some of the top soil that was buried under the road fills.

Noxious Weed Treatment: this would also have a positive affect on soil productivity.

Other Opportunities: None of the other opportunities identified in Chapter II would affect soil productivity.

Consistency with Forest Plan Standards

All Alternatives would meet all Forest Plan soil quality standards: Soil disturbing management practices would strive to maintain at least 80 percent of the activity area in a condition of acceptable productivity potential for trees and other managed vegetation; large woody debris would follow the research guidelines of Graham et al., 1994, to insure the maintenance of site productivity.

FISHERIES

REGULATORY FRAMEWORK

The National Forest Management Act (NFMA) (1976) requires that the Forest Service manage for a diversity of fish habitat to support viable fish populations (36CFR219.19). Regulations further state that the effects on these species and the reason for their choice as management indicator species be documented (36CFR219.19(a)(1). The 1969 National Environmental Policy Act (NEPA) requires analysis of projects to insure the anticipated effects upon all resources within the project area are considered prior to project implementation (40CFR1502.16). Section 7 of the 1973 Endangered Species Act (ESA) includes direction that Federal agencies, in consultation with the United States Fish and Wildlife Service, will not authorize, fund, or conduct actions that are likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitat. Executive Order 12962 (June 7, 1995) states objectives "to improve the quantity, function, sustainable productivity, and distribution of U.S. aquatic resources for increased recreational fishing opportunities by: (h) evaluating the effects of Federally funded, permitted, or authorized actions on aquatic systems and recreational fisheries and document those effects relative to the purpose of this order."

The Forest Plan for the Idaho Panhandle National Forests (IPNF) provides management goals and objectives for the protection of the fisheries resources. The Inland Native Fish Strategy (INFS) amended the IPNF Forest Plan in August 1995 and contains additional standards and guidelines to protect the aquatic environment.

Proposed activities in the Douglas-fir Beetle Project EIS were analyzed with respect to these regulatory requirements in the Fisheries sections. Additional regulatory requirements related to fisheries resources (*e.g.* Clean Water Act and Idaho Water Quality Standards) are addressed in the Water Resources sections.

AFFECTED ENVIRONMENT

Introduction

The cumulative effects areas are made up of 15 groups of watersheds. These groups are Beauty, Beaver, Bumblebee, Coeur d'Alene (CDA) Lake, Cedar, Carlin, Chain Lakes, Fernan Lake, Fourth of July, Hart, Hayden Lake, Nettleton Gulch, Scott Gulch, Steamboat, and Wolf Lodge. Within these watersheds there are 15 watersheds in which analysis was conducted for fish, as displayed in the table below.

Table III-66. Sixth-scale code watersheds and the Hydrological Unit Code (HUC) associated with the watershed.

Name	HUC Number	Acres
Beauty	1701030309	7027
Beaver	1701030130	28183
Bumblebee*	170103010381	14124
Coeur d'Alene Lake*	1701030300	36621
Cedar	1701030306	10062
Carlin	170103030042	7646
Chain Lakes*	1701030318	56228
Fernan Lake	1701030303	11664
Fourth of July	1701030324	13474
Hart*	170103010022	16440
Hayden Lake	1701030512	37538
Nettleton Gulch	170103050621	1564
Scott Gulch	170103010018	1146
Steamboat	1701030109	26780
Wolf Lodge	170103030603	29276

** HUC code numbers may represent a single 6th+ code, although multiple HUCs are within the watershed area*

Fish Presence

These cumulative effects areas contain approximately 200 miles of fish-bearing streams. Fish species that inhabit streams in this area include native populations of westslope cutthroat (*Oncorhynchus clarki*), bull trout (*Salvelinus confluentus*), mountain whitefish (*Prosopium williamsoni*), northern pike minnow (*Ptychocheilus oregonensis*) (formerly squawfish), large-scale sucker (*Catostomus macrocheilus*), torrent sculpin (*Cottus rhotheus.*) shorthead sculpin (*Cottus confusus*), and possibly longnose dace (*Rhinichthys cataractae*) and redside shiner (*Richardsonius balteatus*). Introduced fish species include populations of rainbow trout (*Oncorhynchus mykiss*) and brook trout (*Salvelinus fontinalis*) (Data on file at the Coeur d'Alene River District, Simpson and Wallace 1978). Fish that are the product of hybridization between native cutthroat trout and exotic rainbow trout and between native bull trout and exotic brook trout may be present. The distribution of some of these fish within streams in the cumulative effects areas can be found in the table below.

The current condition and distribution of the fisheries resources within the areas analyzed within this EIS were established by utilizing the best available information including interpretation of information from stream inventories, field reviews, historical records, aerial photographs, analysis of watershed conditions, published scientific literature, discussions with Fisheries Biologists from the Idaho Department of Fish and Game, the United States Fish and Wildlife Service (USFWS), and the Idaho Division of Environmental Quality (DEQ), and comprehensive knowledge of the fisheries resources in the Coeur d' Alene basin. The distribution of selected fish species within the Coeur d'Alene portion of this EIS can be found in the following table.

Codes for Table III-67

Codes for species: *WCT - westslope cutthroat trout, BT - bull trout, RT - rainbow trout, BkT - brook trout, MW - mountain whitefish, Scp - Sculpin*

Codes for access: *Y=access present, no known migration barriers; N=human-caused migration barrier within the stream; N*=natural migration barrier within stream.*

Codes for species present: *- Y - Surveyed and present, LY - Unsurveyed but likely present, N - Surveyed but not found, N* - Natural barrier, LN - Unsurveyed but unlikely present, H - Documented historic, now unlikely, LH - Likely historic, now unlikely.*

Table III-67. Summary of the distribution of selected fish species within selected streams in the project area.

Stream Name	HUC #	Access	WCT	BT	RT	BkT	MW	Scp
Hart area								
Little Grizzly	17010301001215	Y	H	LH	LN	LN	LN	LY
Brown	170103010022	Y	Y	H	LN	Y	LN	Y
Rookie	17010301002212	Y	Y	LH	N	N	N	Y
Hart	170103010022	Y	H	LH	LN	LN	LN	LY
Hopkins	17010301001218	N	Y	LH	LN	LN	LN	Y
Trouble	17010301002403	Y	H	LH	LN	LN	LN	LY
Avery	170103010064	Y	Y	LH	N	N	N	Y
Clee	17010301002418	Y	LY	LH	LN	LN	LN	LY
Main NF CDA River	1701030100	Y	Y	Y	Y	LY	Y	Y
Beaver area								
Beaver	1701030130	Y	Y	H	LY	Y	LN	Y
Trail	170103013012	Y	LY	LH	LN	LY	LN	LY
Last	17010301301209	Y	LY	LH	LN	LN	LN	LY
Lake	17010301301208	Y	LY	LH	LN	LN	LN	LY
Bumblebee area								
Lightner	170103010006	Y	LY	LH	LN	LN	LN	LY
Little NF CDA River	1701030103							
Bumblebee	170103010381	Y	Y	LH	Y	Y	N	Y
Little Bumblebee	170103010378	Y	LY	LH	LN	LN	N	Y
Little Tepee	170103010375	Y	Y	LH	N	Y	N	Y
Steamboat area								
Steamboat	1701030109	Y	Y	LH	Y	N	N	Y
Omaha	170103010903	Y	Y	LH	N	N	N	Y
Indian	170103010936	Y	Y	LH	N	N	N	Y
Barrymore	170103010933	Y	Y	LH	Y	Y	N	Y
Eighty Day	170103010939	Y	LH	LH	LN	LN	LN	LH
Scott Gulch area								
Scott Gulch	170103010018	Y	Y	LH	LN	LN	LN	Y
Fernan Lake								
Fernan	170103030303	Y	LY	LH	LY	LY	LN	LY
Stacel	170103030306	Y	H	LH	LN	LN	LN	H
Dry Gulch	170103030309	Y	H	LH	LN	LN	LN	H
Wolf Lodge area								
Wolf Lodge	170103030603	Y	Y	LH	N	Y	Y	Y
Stella	1701030306030612	Y	Y	LH	N	LY	LN	LY
Lonesome	1701030306030606	Y	Y	LH	N	LY	LN	LY
Clearcut	1701030306030615	Y	Y	LH	N	Y	LN	LY
Unnamed (Dianna)	1701030306030609	Y	LY	LH	LN	LY	LN	LY
Phantom	170103030603061812	N*	Y	LH	N	LN	LN	LY
Blue Grouse	170103030603061809	Y	Y	LH	N	LN	LN	LY
Marie	17010303060309	Y	Y	LH	N	Y	LN	Y
Searchlight	1701030306030903	Y	Y	LH	N	Y	LN	Y

Stream Name	HUC #	Access	WCT	BT	RT	BkT	MW	Scp
Skitwish	1701030306030909	Y	Y	LH	N	LY	LN	Y
Burton	1701030306030906	N*	LN	LN	LN	LN	LN	LY
Cedar area								
Cedar	1701030306	Y	Y	LH	N	Y	N	Y
S.F. Cedar	170103030609	Y	LY	LH	LN	LY	LN	LY
Alder	170103030606	N	Y	LH	LN	LY	LN	LY
4th of July area								
4th of July	1701030324	N	LY	LH	LN	LY	LN	LY
Curran	170103032424	N	LY	LH	LN	LY	LN	LY
Mason	170103032421	N	LY	LH	LN	LY	LN	LY
Service	170103032427	N	LY	LH	LN	LY	LN	LY
Beauty area								
Beauty	1701030309	Y	LY	LH	LN	LY	LN	LY
Varnum	170103030906	N	LY	LH	LN	LY	LN	LY
CDA Lake area								
Carlin area								
Carlin	170103030042	Y	LY	LH	LN	LY	LN	LY
Pleasant	17010303004212	Y	LY	LH	LN	LY	LN	LY
Carrill	17010303004215	Y	LY	LH	LN	LY	LN	LY
Johns	17010303004206	Y	LY	LH	LN	LY	LN	LY
No	17010303004212	Y	LY	LH	LN	LY	LN	LY
Chain Lakes area								
Blue lake	170103031809	N	Y	LH	LN	Y	LN	LY
Cottonwood	17010303180906	Y	Y	LH	LN	Y	LN	LY
Fortier	170103031815	Y	Y	LH	LN	Y	LN	LY
Armstrong	17010303181503	Y	LY	LH	LN	LY	LN	LY
Killarney	17010303180022	Y	LY	LH	LN	LY	LN	LY
Rose	170103031818	Y	LY	LH	LN	LY	LN	LY
Main CDA river	1701030318	Y	Y	Y	Y	Y	Y	Y
Nettleton Gulch area								
Nettleton Gulch	170103050621	N	N	N	N	N	N	N
Hayden Lake area								
Hayden	170103051206	Y	Y	N	Y	Y	N	Y
Stump	170103051206	Y	LY	N	LY	LY	LN	LY
North Fork Hayden	17010305120612	Y	Y	N	Y	Y	N	Y
Shamrock	17010305120612	Y	H	N	LY	LN	LN	LY
Buckles	17010305120612	N	H	N	LY	LN	LN	LY
Hollister	17010305120612	Y	Y	N	LY	LY	N	LY
Bradbury	17010305120612	N	H	N	LY	LN	LN	LY
Unnamed Tributary	17010305120612	Y	Y	N	LY	LN	LN	LY
East Fork Hayden	17010305120615	Y	Y	N	Y	Y	N	Y
Line	17010305120615	Y	Y	N	N	N	N	Y
Cardin	17010305120615	Y	H	N	LY	LY	LN	LY
Ridge	1701030512061506	Y	H	N	LY	LY	LN	LY
Ulrich	17010305120615	Y	LY	N	LY	LY	LN	LY
Hells Canyon	1701030512061521	Y	LY	N	LY	LY	LN	LY
Straight	17010305120615	Y	LY	N	LY	LY	LN	LY
Conie	1701030512061515	Y	LY	N	LY	LY	LN	LY
Todd	17010305120615	N	LT	N	LY	LY	LN	LY
Chilco	1701030512061512	Y	LY	N	LY	LY	LN	LY
Nilsen	17010305120909	Y	LY	N	LY	LY	LN	LY
Mokins	170103051212	Y	Y	N	LY	LY	LN	LY
Two Forks	170103051212	N	H	N	LN	LN	LN	LY
Jim	170103051215	Y	LY	N	LY	LY	LN	LY
Yellowbanks	170103051218	Y	Y	N	LY	LY	LN	LY
Three Forks	170103051212	N	LY	N	LY	LN	LN	LY

Due to the large number of fish species within the cumulative effects areas, analysis of direct, indirect, and cumulative effects to fish uses the concept of Management Indicator Species (MIS). Under this concept, larger groups of organisms or communities are believed to be adequately represented by a subset of the group (Idaho Panhandle National Forest Plan 1987). The use of Management Indicator Species within the area affected by this EIS is simple since historically the area was dominated by cold water biota and these species

are sensitive to the types of land management action proposed under most alternatives (Meehan 1991). The Forest Plan identifies westslope cutthroat trout and bull trout as potential Management Indicator fish species for the effects of management actions on fisheries and they are used for that purpose in this document. The life histories of one additional species listed on the Regional Foresters sensitive species list, the torrent sculpin, are included below. Inasmuch as the torrent sculpin is also a cold water species, the effects of this action to these species would be similar, where these species occur in the project area, and is covered under the effects to the Management Indicator Species. Two other sensitive species, the burbot and redband cutthroat, will not be addressed in the EIS because they are not known to occur in the Coeur d'Alene Watershed (Simpson and Wallace 1978).

Westslope cutthroat trout and bull trout are native to streams in the project area (Maclay 1940, Dunnigan 1997, Horton 1985, Lider and Techau 1994, Lukens et al 1976). Westslope cutthroat trout are known to be utilizing streams within the project area for migration, spawning, rearing, and over-wintering. Although bull trout were historically documented in the project area reproducing populations have not been recently documented. Individual fish, however, have been reported within the mainstem Coeur d' Alene River. Nonetheless, westslope cutthroat trout and bull trout have been selected as appropriate Management Indicator Species for the fisheries analysis of the vegetative and watershed restoration opportunities related to tree mortality caused by Douglas-fir beetle. Although both fish do not exist in all streams one of the two is found in most large streams. These species are indicators for all the cold water biota within the stream segment (Meehan 1991).

Westslope Cutthroat Trout

Westslope cutthroat trout are listed as "Sensitive" by Region 1 of the USDA Forest Service and also listed as "species of special concern" by the State of Idaho. In addition, the U.S. Fish and Wildlife Service (USFWS) lists westslope cutthroat trout as a "Species of Concern" with respect to section 7(c) of the 1973 Endangered Species Act (ESA) (3/2/98 letter, FWS 1-9-99-SP-158). This species is currently under review for listing under the Endangered Species Act.

Westslope cutthroat trout are native to many of the watersheds in the project area. Their preferred habitat is cold, clear streams that possess rocky, silt-free riffles for spawning and slow, deep pools for feeding, resting, and over-wintering (Reel 1989). Pools are a particularly important habitat component as cutthroat trout occupy pool habitat more than 70% of the time (Mesa 1991). Other key features of cutthroat habitat are large woody debris (LWD) for persistent cover and habitat diversity as well as small headwater streams for spawning and early rearing.

Resident, fluvial, and adfluvial life history strategies of westslope cutthroat trout are likely present within watersheds in the project area (Maclay 1940, Dunnigan 1997, Horton 1985, Lider and Techau 1994, Lukens et al, 1976). Resident populations remain in river tributaries throughout their life. Migratory populations (fluvial and adfluvial fish) use river tributaries for early rearing and spring spawning as adults, but typically migrate to river (fluvial) or lake (adfluvial) habitat as they mature. In the fall, fish that have not previously returned to river and lake areas migrate to deeper water where they congregate and over-winter (Bjornn 1975). Streams within the project area are utilized by westslope cutthroat trout representing all life history strategies during various phases of their life cycle.

A population status review of the westslope cutthroat trout in Idaho has determined that populations in northern Idaho have declined over their historic distribution with viable populations existing in only 36% of the original Idaho range. The primary cause of the decline was found to be habitat degradation (Rieman and Apperson 1989).

Of the streams listed in Table III-67, the following streams are likely the most important to species persistence to westslope cutthroat within the analysis areas:

- *Coeur d' Alene River (in the vicinity of the Steamboat and Hart analysis areas)*
- *Steamboat Creek*
- *Wolf Lodge Creek (excluding Cedar Creek)*
- *Carlin Creek*
- *Hayden Creek*

The main Coeur d'Alene River system and specifically the lower reaches provides critical winter habitat for westslope cutthroat trout. The remaining larger, deep pools are critical for winter refugia areas for adult fish. Lewynsky (1986) found that fluvial fish concentrated in a few large runs and pools during winter. These areas seem to be critical for the maintenance of stocks of fluvial fish. Steamboat creek is a major tributary to the lower section of the North Fork of the Coeur d' Alene River. Resident, fluvial and possible adfluvial fish utilize this watershed for spawning and rearing. It has a variety of stream types (size , flows and complexity) that appear to provide fish with diverse habitats allowing for long term persistence within the watershed. Factors which could be limiting fish production relate to amount of roads within the watershed. Hillslope roads have been contributing excessive levels of sediment which may be affecting channel conditions and pool habitat. Valley bottom roads could also be affecting channel condition by increasing sediment loading (from road failures). Both could be negatively affecting channel/floodplain connectivity and affect the distribution and stability of large wood which influences instream cover and stream complexity. Both of these parameters can have dramatic effects on fish production.

Wolf Lodge Creek and its tributaries, and Carlin Creek and its tributaries are very important to the persistence of adfluvial populations of cutthroat trout within the northern end of Lake Coeur d' Alene. As in Steamboat, these watersheds have a variety of stream types that appear to provide fish with diverse habitats allowing for long-term persistence within the watershed. Sediment loads from hillslope roads and the effects on channel morphology from timber harvest appear to be the greatest impact from national forest system lands. Development within the flood-prone area on private land also impacts the persistence of fish within the Wolf Lodge Creek basin.

The Hayden Creek watershed provides for the greatest number of miles of spawning and rearing streams for adfluvial populations in Hayden Lake. Again, the size of the watershed provides a variety of stream types that appear to provide fish with diverse habitats allowing for long-term persistence within the watershed. Sediment from failing roads and valley bottom roads appear to be a major factor that could be limiting fish production. These road systems and sediment loads are affecting channel conditions and pool habitat. Valley bottom roads may be affecting channel conditions by increasing sediment loading (from road failures), negatively affecting channel/floodplain connectivity and affecting the distribution and stability of large wood which influences instream cover and stream complexity. Migration barriers may also be negatively affecting fish production .

Bull Trout

Bull trout are also native to watersheds draining into Lake Coeur d' Alene and the North Fork of the Coeur d' Alene River within the project area. Currently, only occasional migrants are found within the Coeur d'Alene Watershed. They have been noted in the main Coeur d' Alene river adjacent to Hart Analysis area and are known to occur within Lake Coeur d' Alene (J. Davis Idaho Department of Fish and Game, Personnel Communication). Bull trout appear to have more specific habitat requirements than other salmonids (Rieman and McIntyre 1993). Habitat characteristics including water temperature, stream size, substrate composition, cover and hydraulic complexity have been associated with the distribution and abundance (Jakober 1995; Dambacher and others, 1994; Rieman and McIntyre 1993).

Stream temperature and substrate composition are important characteristics of suitable bull trout habitats. Bull trout have repeatedly been associated with the coldest stream reaches within basins. The lower limits of many strong bull trout distributions mapped by Lee et al. (1997) correspond to a mean annual air temperature of about 4 degrees Centigrade (ranging from 3 to 6 degrees Centigrade) and should equate to ground water temperatures of about 5 to 10 degrees Centigrade (Meisner 1990). Temperature can be strongly influenced by land management (Henjum et al. 1994).

In a status review of bull trout on the Idaho Panhandle National Forests, stocks from the Coeur d' Alene watershed were considered to be at high risk of extinction (Cross 1992). Genetic analysis has shown bull trout within many sub-basins of Northern Idaho may be unique stocks (B. Rieman, Rocky Mountain Research Station, personal communication), but are closely linked to the upper Columbia River group - one of three major groupings of bull trout throughout the Columbia and Klamath River drainages (Williams, unpublished). Bull trout have recently (within the last 10 years) been documented or observed in the main Coeur d' Alene river which is within the cumulative effects area for this project. However, seasonal bull trout migration up and down from the mouth of Prichard creek makes it likely that individuals periodically inhabit portions of the Coeur d' Alene drainage. No individuals are known to spawn within the basin.

Of the streams listed within Table III-67, the following streams are likely the most important to species persistence for bull trout within the analysis areas:

- *Coeur d' Alene River (in the vicinity of the Steamboat and Hart Analysis areas)*
- *Steamboat Creek*
- *Beauty Creek*
- *Wolf Lodge Creek*

The importance of the main Coeur d' Alene River, Steamboat Creek and Wolf Lodge Creek are presented in the discussion on cutthroat trout. Beauty Creek may be important due to water temperatures. Bull trout have repeatedly been associated with the coldest stream reaches within basins. Looking at aspects (north) and channel type (A), which is a narrow steep canyon with a relatively closed canopy, Beauty Creek may maintain water temperatures preferred by bull trout. Increases in water temperatures as affected by timber harvest and channel widening (excessive sediment levels due to roads) may be a factor affecting fish production within this basin.

Torrent Sculpin

Torrent sculpin were added to the Idaho Panhandle's sensitive species list March 12, 1999. This species has been found within the mainstem Coeur d'Alene River and larger tributary streams. Their preferred habitat is riffle habitat in medium to wide streams and rivers (Markle et al. 1996). Large adults (>150 mm), however are found in pools. Spawning usually occurs in May and June and occurs in riffles with moderate to swift flows. The range of torrent sculpin overlaps with both westslope cutthroat and historic bull trout and are also a cold water species. Because this species primarily inhabits large streams this species would only be affected by this project if the magnitude of the effects altered habitat conditions in the larger streams. The possible effects on this species is covered by analyzing effects on the cold-water Management Indicator Species. This species will be assumed present in all larger streams.

Habitat Connectivity

Environmental conditions in the planning area have been influenced by natural events and processes as well as human activities. Effects of natural disturbances such as volcanic eruptions (such as Mt. St. Helens, Mt. Mazama), historic fires, landslides, and flooding have interacted with other land-evolving processes (for example, geologic up-lift and stream channel down-cutting) to form the basic character of watersheds and the dependent stream resources. Due to variability in the location, frequency, intensity, and ultimately, the effects of natural processes on the physical environment, dynamic landscapes with diverse conditions are formed at

various spatial scales. Biological communities including native fish populations led to development of functional ecosystems that are inherently resilient to effects from natural disturbance regimes representing pulse-type disturbance (Reeves *et al.* 1995). Pulse disturbances influence the natural range of environmental conditions that are expected for ecosystems functioning at broad geographic scales but typically allow systems to begin recovering to pre-disturbance conditions after the disturbance.

Natural disturbance regimes and their associated properties (sedimentation rates and other influences on aquatic habitat) have been altered in the cumulative effects area by human activity. Land use activities that have modified natural disturbance characteristics include railroads, roads, flumes/chutes, settlements/towns, grazing, mining, stream modifications (constriction, channelization, diversion, dams, culverts, and cleaning - removal of woody debris), logging, and fire suppression. Many of these human influences are considered press-type disturbance that continue to affect the condition and trend for fisheries resources long after the initial disturbance. Press disturbance differs from pulse disturbance in several aspects but generally press disturbance is persistent in ecosystems and impairs the ability for ecosystems to recover to pre-disturbance conditions (Reeves *et al.* 1995). Within the cumulative effects area, the recovery process from pulse disturbance has been hindered by the presence of various press disturbances. The following discussion relates these findings to the existing condition of fish habitat.

In general, watersheds within Northern Idaho can be described by one of four disturbance regimes. A description of those disturbance regimes and the watersheds that can be described by that regime follow.

Description of Unburned Watersheds Without Management Activities

There are few watersheds (greater than 5000 acres) within the Forest that meet these criteria and none within the analysis areas. Conditions of these watersheds include complex stream conditions with complex fish habitat. The probability of persistence of resident fish within these basins is high. The stream conditions within these basins serve as reference conditions for other unburned watersheds.

Description of Unburned Watersheds With Management Activities

Watersheds not burned since the early 1900's in the cumulative effects area, have experienced more recent disturbances associated with land management. Various intensities of road activity (*e.g.* construction, reconstruction, and maintenance), timber harvest, mining, and/or recreational facilities have influenced the rate of fish habitat recovery from historical disturbances in several streams. The existing transportation system in the cumulative effects area is an extension of historic road locations which paralleled stream courses from the valley bottoms to the mountain ridges in many cases. Riparian roads in the cumulative effects area have high levels of erosion during flood events, accelerate stream sedimentation rates, reduce channel stability, inhibit flood plain functions, reduce large woody debris recruitment potential, reduce stream shade, and otherwise impair the development and maintenance of quality fish habitat. The table below lists the fish-bearing streams which have valley bottom roads that are affecting fish habitat conditions at various levels (as displayed in the table below). Existing fish habitat conditions are generally below desired levels and the trend is not favorable in all these subwatersheds within this area, except Hells Canyon Creek.

Table III-68. Watersheds not burned by large fires, in which timber harvest activities have occurred. The values listed in the effects to riparian areas is approximate.

Stream Name	HUC #	Area of Riparian Roads	Area of Riparian Harvest
Trail	170103013012	>25%	>25%
Last	17010301301209	None	Y
Lake	17010301301208	>25%	Y
Lightner	17010301006	>25%	Y
Little N.F. CDA	1701030103	>25%	>25%
Bumblebee	170103010381	>25%	>25%
Little Bumblebee	170103010378	>10%	>10%
Little Tepee	170103010375	<10%	<10%
Omaha	170103010903	>25%	>25%
Fernan	170103030303	>25%	>10% but <25%
Stacel	170103030306	>25%	>10% but <25%
Dry Gulch	170103030309	>25%	>25%
Wolf Lodge	170103030603	Y	Y
Stella	1701030306030612	None	None
Phantom	170103030603061812	None	None
Blue Grouse	170103030603061809	None	None
Marie	17010303060309	None	None
Searchlight	1701030306030903	>10% but <25%	Y
Skitwish	1701030306030909	None	None
Burton	1701030306030906	None	<10%
Lonesome	1701030306030606	None	None
Clearcut	1701030306030615	<10%	>25%
Unnamed (Dianna)	1701030306030609	None	None
Cedar	1701030306	>25%	>25%
S.F. Cedar	170103030609	>25%	>10% but <25%
4th of July	170103032403, 15	>25%	>25%
Curran	170103032424	None	None
Service	170103032427	None	None
Varnum	170103030906	>25%	Y
Carrill	17010303004215	None	<10%
Blue Lake	170103031809	>25%	Y
Cottonwood	17010303180906	>25%	Y
Fortier	170103031815	<10%	>10% but <25%
Armstrong	17010303181503	>10% but <25%	Y
Killarney	17010303180022	<10%	Y
Stump	170103051206	<10%	Y
N.F. Hayden	17010305120612	>25%	>25%
Shamrock	17010305120612	<10%	<10%
Buckles	17010305120612	<10%	>10% but <25%
Hollister	17010305120612	<10%	<10%
Bradbury	17010305120612	>10% but <25%	>25%
Unnamed Trib	17010305120612	None	None
E.F. Hayden	17010305120615	>25%	>25%
Line	17010305120615	>25%	>25%
Cardin	17010305120615	>25%	Y
Ridge	1701030512061506	<10%	Y
Ulrich	17010305120615	>25%	Y
Hells Canyon	1701030512061521	None	None
Straight	17010305120615	<10%	<10%
Conie	1701030512061515	<10%	Y
Todd	17010305120615	<10%	Y
Chilco	1701030512061512	<10%	Y
Nilsen	17010305120909	None	None
Mokins	170103051212	<10%	<10%
Two Forks	170103051212	<10%	<10%
Jim	170103051215	>25%	Y
Yellowbanks	170103051218	<10%	<10%
Three Forks	170103051212	<10%	Y

Description of Burned Watersheds Without Management Activities

Early 20th century fires burned over these parts of the planning area and altered the condition and trend for many streams. Areas that reburned within a relatively short time span have been slower to recover from these fires. Most stream channels in areas that have not been entered for harvest have adjusted to altered hydrologic conditions resulting from historic fires and these channels are generally stable. Riparian areas affected in this way typically offer less protection for stream temperatures (*i.e.* stream shade) and have a lower recruitment potential for large woody debris. A lack of large woody debris recruitment can inhibit the development and maintenance of diverse habitat conditions including quality pool habitat and complex cover. Though the condition of fish habitat (maximum stream temperatures, aquatic habitat diversity, and cover complexity) in watersheds have recently been influenced, the trends are favorable for sustaining salmonid populations. Fish access to the limited available habitat in Trouble Creek, is impeded by human-made barriers.

Description of Burned Watersheds With Management Activities

Streams in watersheds that were logged following historic fires have experienced similar but more prolonged residual effects (as displayed in the table below) than those streams in watersheds where salvage logging did not occur. Logging and associated activities intensified the effects of fires because unburned trees that would otherwise have been available to facilitate fish habitat maintenance and recovery were removed by various means (*e.g.* roads, railroads, flumes, and splash dams) which often resulted in additional disturbance to stream channels and associated riparian areas. Increased impacts to streams and riparian areas has extended the recovery period necessary to develop quality fish habitat. As a result, fish habitat conditions in streams that have most recently been influenced, primarily by wildfires and the ensuing salvage logging activities, are generally earlier in the recovery process than streams in watersheds that were not salvage logged. Nonetheless, a favorable trend for fish habitat conditions exists for Hopkins, Pleasant and No Creeks. Fish access to suitable habitat in Scott, Eighty Day, Little Grizzly, Avery, Clee, Rose, Mason and Hopkins Creeks is impeded by human-made barriers. All the barriers, except Eighty Day Creek, are on county roads or state highways.

Table III-69. Watersheds burned by large fires, in which timber harvest activities have occurred. The values listed in the effects to riparian areas is approximate.

Stream Name	HUC #	Area of Riparian Roads	Area of Riparian Harvest
Little Grizzly	17010301001215	<10%	<10%
Brown	170103010022	>25%	>25%
Rookie	17010301002212	None	<10%
Hart	170103010022	<10%	None
Hopkins	17010301001218	<10%	<10%
Avery	170103010064	None	None
Clee	17010301002418	None	None
Steamboat	1701030109	>25%	>10% but ≤25%
Indian	170103010936	>25%	>25%
Barrymore	170103010933	None	>25%
Eighty Day	170103010939	None	None
Scott	170103010018	>25%	>25%
Mason	170103032421	>25%	<10%
Beauty	1701030309	>25%	>10% but ≤25%
Carlin	170103030042	>25%	>10% but ≤25%
Pleasant	17010303004212	None	<10%
No	17010303004212	None	None
Rose	170103031818	<10%	>25%
Main CDA River	170103010024, 00	>25%	>25%
Hayden	170103051206	>25%	>25%

General Effects of Land Management Activities

Newer roads and some historic roads within the planning area have been constructed in more stable locations higher on the hillslopes and are of less concern for fisheries resources (please refer to the "Watershed" discussions). However, roads on hillslope locations can contribute to impaired fish habitat conditions. These roads can elevate stream sedimentation by increasing surface erosion potential and mass erosion potential. Fill failures from sections of riparian roads during the winter of 1995-1996 delivered approximately 11,500 cubic yards of material in eighteen streams within the analysis area and considerably altered the condition and trend for fish habitat.

Recent (past five years) timber harvest units, mining, and recreational facilities have generally had a less dramatic effect on fisheries resources than historical fires, historical salvage operations, and the existing transportation system (Furniss et al. 1991). Recent timber harvests (within the past five years) and associated roads have contributed to cumulative effects that are affecting recovery of fish habitat conditions in these streams .

The quality of fish habitat conditions in the cumulative effects area have generally been compromised but are adequate to support viable populations of some cold-water biota, especially resident fishes. Diverse conditions of the habitat components (stream temperatures, aquatic habitat diversity, cover complexity, and channel stability) that are primarily responsible for regulating populations of native salmonids in the cumulative effects area have enabled these populations to persist albeit at suppressed levels. Analysis of existing conditions indicates that many streams in the cumulative effects area continue to recover from the residual effects from historic pulse-type (fires, volcanos) disturbance acting in isolation or in combination with effects from on-going press-type (timber harvest, road building) disturbances (Chamberlin et al 1991).

One possible effect of land management on Management Indicator fish species that is not addressed in the fisheries section is changes in peak flow. Inasmuch as large-scale fires in Northern Idaho resulted in the historic condition of this basin often having more openings than the current condition (IPNF Monitoring Plan 1998) it is unlikely any changes in peak flows resulting from management activities would have a direct, indirect, or cumulative effect outside the conditions in which these fish evolved. In addition, Jones and Grant (1996) state the natural range of variability of peak flow varies by an order of magnitude whereas the increase associated with human activities are no more than 50%. This once again suggests that fish have evolved to live through variable flows. The conditions fish have not evolved with, however, is aquatic habitat that has been greatly simplified as the result of habitat modification; these are covered in environmental consequences.

Because most of the planning area is in watersheds that have been negatively affected by human management the goal for future management is to restore processes that form stream habitat. The easiest way to achieve this goal is to reduce the effects of roads while maintaining or improving riparian habitat conditions. While the minimum requirement for this project is to maintain fish habitat (INFS 1995) the fisheries resource will be served by improving stream habitat conditions.

ENVIRONMENTAL CONSEQUENCES

Methodology

Direct and Indirect effects

Existing conditions were established for primary habitat components believed to be influencing the productive potential of the Management Indicator fish species within the planning areas. Changes to these habitat components by the action alternatives are addressed by measuring changes in physical structures that

affect the habitat components important to fish and are effected by management actions. Habitat components of interest include stream temperature, aquatic habitat diversity, cover complexity, and channel stability.

Stream temperature is one indicator of aquatic habitat conditions for this project area (Hicks et al. 1991). Stream temperature information collected during stream surveys is evaluated in relation to Idaho State Water Quality Standards for designated beneficial uses. The direct removal of riparian vegetation through road construction and timber harvest can indirectly change stream temperature by increasing sunlight to the water. If this increases outside the range that cutthroat trout evolved, detrimental effects may occur (6-17 C; Bjornn and Reiser 1991). Because of the low water temperature requirements of bull trout any increase in stream temperature would likely have a negative effect on this species

Habitat diversity (composition and quality) is another indicator of aquatic habitat conditions and is assessed as to the quantity and degree of development of various types of aquatic habitat (*e.g.* pools, riffles, etc.). Stream segments possessing numerous habitats with a wide variety of stream velocities, water depths, and physical habitat configurations are considered more diverse and have a greater potential for meeting the habitat requirements of naturally reproducing trout populations. Removal of riparian vegetation, which reduces instream wood, along with increases in bedload and sediment, and changes in stream morphology can affect the composition and quality of habitat.

Cover complexity is also an indicator of habitat conditions and is evaluated by the degree of habitat partitioning by various structural elements such as large woody debris, boulders, and undercut banks. This physical separation within habitat units can help maximize fish production by decreasing competition and aggression, reducing predation, increasing carrying capacity, and producing micro-habitat conditions that minimize energy requirements and provide refugia for fish inhabitants. The same information used to reflect changes in habitat diversity are used to display changes to cover complexity, particularly instream wood and channel morphology.

Channel stability is another indicator for fish habitat conditions because it influences the quality of pool habitat as well as helps to establish the trend for aquatic habitat conditions. Channel stability is discussed in the "Watershed" section of this Final EIS and incorporated into the assessment of fisheries resources. The relationship between upslope processes and stream channel condition were also assessed by incorporating the analysis of the hydrologic condition within the project area. Changes to channel stability are highly dependent upon changes in water yield and timing, and bedload movement. Other selected features that are believed to influence the condition of riparian areas, and subsequently fish habitat are also discussed.

Indirect effects

Because of the difficulty of directly measuring stream habitat components as well as delay between land management actions and altered stream conditions, this EIS tracks management actions that could alter stream conditions. The relationship between the habitat component and the measurement of change is discussed below.

Riparian Harvest: For this EIS the amount of riparian harvest is a measurement for changes in stream temperature, habitat diversity, cover complexity, and channel stability. The direct effect of riparian harvest is the reduction of shade and large wood component near streams. The indirect effect of reducing the amount of streamside vegetation include altering timing and amount of sediment delivery, wood loading in stream, stream temperature, and the hydrologic regime (Meehan et al. 1991). The cumulative effects of riparian harvest can be reduced egg-to-fry survival (by increased fines in reeds) and reduced adult survival (by increasing temperature outside of tolerated range and/or by altering carrying capacity by reducing highly utilized habitat) of Management Indicator species. For purposes of consistency in this analysis, an average distance of 300 feet from fish-bearing streams will be considered as riparian habitat. Although not all the vegetation within this 300 foot buffer will consist of vegetation that is dependent on the water table, it does provide conditions necessary to maintain these types of vegetation (FEMAT, 1993). In addition, riparian

harvest within 75 feet of intermittent streams will be considered riparian harvest. By maintaining riparian habitat, the Forest will trend toward meeting the large woody debris Riparian Management Objective in INFS.

Sediment Delivery Risk: The risk of sediment delivery will be tracked by risk of failure at crossings and temporary/permanent road constructions. A majority of these risks are located where roads cross streams. The direct effect of sediment delivery at roads can be reduced passage of fish. The indirect effects of these failures include increased fine sediment in redds, and channel simplification due to torrents. The cumulative effects of additional sediment delivery can be reduced egg-to-fry survival (by increased fines in redds) and reduced adult survival (by altering carrying capacity by reducing highly utilized habitat such as pools) of Management Indicator Species. The cumulative effects related to road failures can ultimately lead to a decline in fish number (Furniss et al. 1991). Reducing the amounts sediment entering streams will result in a trend toward the Pool Frequency and the Width/Depth Riparian Management Objectives.

Increased Fish Passage: The placement of culverts at road crossings alters the ability of fish to utilize stream habitat above the culvert. The direct effects of modifying these culverts is increased fish passage. The indirect effects of fish passage is the movement of fish to portions of streams not previously used but also replacement activities may increase short-term sediment production. The cumulative effects of increased passage is the increased probability of persistence of the Management Indicator Species. Passage for this analysis will be focused on spring migration of adult westslope cutthroat and summer/fall migration of bull trout.

Reduced Length of Encroaching Roads: The fourth of these measures of change will be the amount of encroaching roads removed as a result of restoration activities. Direct effects of reducing the length of encroaching roads is reduced flow velocity. Indirect effects are an increase in habitat complexity and fish carrying capacity. Cumulative effects are increased numbers of fish. Because valley bottom roads pose a significant risk for fish (Dose and Roper 1994, Hick et al. 1991), reducing these roads is extremely important to maintaining the long-term viability of fish species (including the Management Indicator Species), as well as maintaining terrestial species within the basin that rely on riparian habitat. By reducing the amounts of encroaching road the result will be trending towards the Pool Frequency and the Width/Depth Riparian Management Objectives.

Effects to Management Indicator Species Habitat Components

Some activities, in addition to the activities described in the EIS are common to all alternatives and are described under "Reasonably Foreseeable Activities" (Appendix E) . All future decisions associated with those projects identified as Reasonably Foreseeable will need to complete consultation with the U.S. Fish and Wildlife Service prior to the decision. Each of these activities has the potential to alter various aspects of watershed conditions. Protective measures were recommended and incorporated into the designs for most of these projects allowing watershed resources to be maintained. Effects to fisheries resources can be expected from these activities, and any action alternative under this analysis is considered to have additive effects when combined with the No-Action Alternative.

Direct, Indirect and Cumulative Effects at the Analysis Area Scale

Direct and Indirect Effects

Riparian Harvest: Loss of riparian habitat does not benefit the Management Indicator Species. This loss of riparian vegetation is the direct result of road construction across Riparian Habitat Conservation Areas (RHCA's) to access timber harvest units within some of the watersheds (as displayed in the table below). The value of zero means no harvest of riparian vegetation. No timber harvest units would occur within RHCA's. Alternatives A, C and G propose no new road construction, so would not change riparian vegetation. Alternative D would remove the greatest amount of riparian vegetation. Alternatives B and E are the next highest level of incursion into RHCA's with roads, followed by Alternative F. The majority of these channel crossings are in intermittent drainages and all are in stream reaches where fish are not present. Some of the

crossings maybe within swales which have no defined channel and limited ability to move sediment or transport wood. These areas would only be active during snow melt or summer storm events. No measurable change in stream temperature within fisheries reaches should be realized. Increases in temperatures should be localized within the intermittent reaches. In addition to removing shade, the removal of riparian habitat would reduce the amount of large woody debris that is eventually incorporated into the stream. The direct effect of this is less wood in the channel. The indirect effect is a slight reduction in pool habitat, increased channel gradient and stream velocity. The cumulative effect of this would be limited to reducing fish numbers in small downstream reaches proximate to the removal of riparian habitat. The small amount of riparian harvest, in combination with its localized effect, would not result in a significant cumulative effect to Management Indicator Species within the 15 cumulative watershed effect areas.

Table III-70. Approximate amount of vegetation removed within Riparian Habitat Conservation Areas (value are recorded in feet).

Watershed	Alt. A	Alt. B	Alt. C	Alt. D	Alt E	Alt F	Alt G
Beauty	0	0	0	0	0	0	0
Beaver	0	0	0	138	0	0	0
Bumblebee	0	46	0	46	46	0	0
CDA Lake	0	0	0	48	0	0	0
Carlin	0	0	0	0	0	0	0
Chain Lakes	0	118	0	210	118	0	0
Fernan Lake	0	227	0	295	227	227	0
Fourth of July	0	0	0	0	0	0	0
Hart	0	104	0	104	104	0	0
Hayden Lake	0	81	0	258	81	81	0
Cedar	0	0	0	0	0	0	0
Nettleton	0	0	0	0	0	0	0
Scott	0	0	0	0	0	0	0
Steamboat	0	0	0	0	0	0	0
Wolf Lodge	0	0	0	90	0	0	0

Sediment Delivery Risk: The short term effects are related to the number of new culverts crossing streams and the length of the new roads (as displayed in the table below). Any value greater than zero is a short-term increase in risk. In contrast, values in the long-term effects is the amount of annual risk of sediment delivery. Any value in these columns less than in Alternative A (a greater negative value) is a reduction in risk, while any values greater than Alternative A is an increased risk (smaller negative value). In all watersheds except Fernan, Alternative G would have the highest amount of sediment risk reduction. This is a direct result of road channel crossing upgrades (increased culvert size to meet 100-year-flow) and the removal of road channel crossings and encroaching roads. Alternatives C, E, and D respectively, would have the next highest risk reduction in sediment delivery. This is a direct result of road channel crossing upgrades (increase culvert size to meet 100-year-flow) to access timber harvest units and the removal of unmaintained crossings and roads. The No-Action Alternative (Alternative A) would have the lowest risk reduction in sediment delivery, except in the Fourth of July watershed, which is equal under all alternatives. Reductions in the risk of sediment delivery should be paralleled by decreases in bedload and sediment, thus changes in stream morphology could be positively affected, having net benefits to the composition and quality of fish habitat. The small amount of road building in riparian areas, in combination with upgrading culverts (thereby reducing risk) would not result in a significant cumulative effect to the Management Indicator Species within the watershed. Given the amount of roads within the cumulative effects areas, the benefits of restoration activities would be minimal but are a necessary first step towards restoration of watersheds. There would be a short-term increase in sediment under all alternatives (except Alternative A) with the replacement of stream crossings within previously-decommissioned roads or newly constructed roads. With the foreseeable removal of stream channel crossings under Alternative A, there would be a short-term increase in sediment in selected watersheds.

Table III-71. Approximate amount of sediment delivery risk (additions with a + and reduction with a -) associated with stream crossing restoration activities. Data is for roads used in alternatives and inventoried or estimated stream crossings.

6th Code HUC	Alt. A ST	Alt. A LT	Alt. B ST	Alt. B LT	Alt. C ST	Alt. C LT	Alt. D ST	Alt. D LT	Alt E ST	Alt E LT	Alt F ST	Alt F LT	Alt G ST	Alt G LT
Beauty	0/0	0	0/4	-107	0/4	-107	0/4	-107	0/4	-107	0/0	0	0/0	-134
Beaver	0/0	-74	1.3/2	-123	0/0	-125	4.1/3	-123	1.4/2	-123	1.4/2	-123	0/0	-133
Bumblebee	0/0	0	0.7/9	-11	0/8	-12	0.7/9	-11	0.7/9	-11	0/0	0	0/0	-32
CDA Lake	0/0	0	0/0	-12	0/0	-12	0.3/1	-11	0/0	-12	0/0	0	0/0	-12
Carlin	0/0	-121	0/0	-127	0/0	-127	0/0	-127	0/0	-127	0/0	-127	0/0	-133
Chain Lakes	0/0	-97	1.3/3	-338	0/0	-341	2.7/5	-337	1.3/3	-338	0.4/0	-141	0/0	-405
Fernan Lake	0/0	-8	1.7/4	-122	0/0	-127	2.8/5	-122	1.7/4	-122	1.7/4	-127	0/0	-130
Fourth of July	0/0	-109	0/0	-109	0/0	-109	0/0	-109	0/0	-109	0/0	-109	0/0	-109
Hart	0/0	0	0.7/2	+2	0/0	0	0.7/2	+2	0.7/2	+2	0/0	0	0/0	-45
Hayden Lake	0/0	0	4/6	-130	0/4	-131	4.7/12	-183	1.3/6	-130	1.3/6	-128	0/0	-321
Cedar	0/0	0	0/0	-8	0/0	-8	0/0	-8	0/0	-8	0/0	-7	0/0	-8
Nettleton	0/0	0	0/0	0	0/0	0	0/0	0	0/0	0	0/0	0	0/0	0
Scott	0/0	0	0/0	0	0/0	0	0/0	0	0/0	0	0/0	0	0/0	NI
Steamboat	0/0	0	0.8/0	-14	0/0	-14	0.8/0	-14	0.8/0	-14	0/0	0	0/0	-43
Wolf Lodge	11/6	-56	11/6	-193	11/6	-195	13.1/8	-220	11/6	-193	11/6	-193	11/6	-237

ST (short term) = the approximate miles of new road (temporary and permanent road miles) and the approximate number of new stream crossings (permanent, temporary, and reinstalled). LT (long term) = the potential reduction or addition of yearly sediment that could be delivered from the inventoried transportation system. Transportation systems include both non-system and system roads. Risk reduction includes the upgrading and/or removal of stream crossings (risk of failure multiplied by sediment volume). "NI" = no risk sites were inventoried.

Increased Fish Passage: Alternatives that remove barriers to fish passage would be a benefit to the Management Indicator species. The greater the value, the greater the benefit.

The greatest amount of habitat is made available to fish with Alternative G . Alternatives D and E have the next greatest amount. The removal of these barriers through culvert removals and upgrades allows the fish to utilize more habitat than is present under the existing conditions and may lead to more genetic diversity by reconnecting isolated stocks of fish. These projects would have no cumulative negative effects to the Management Indicator Species within the 15 cumulative watershed effect areas. In contrast, where passage is increased there is likely to be a direct benefit to the Management Indicator Species.

Table III-72. Increased fish passage (approximate miles).

Watershed	Alt. A	Alt. B	Alt. C	Alt. D	Alt E	Alt F	Alt G
Beauty	0	1.2	1.2	1.2	1.2	0	1.2
Beaver	0	0	0	0	0	0	0
Bumblebee	0	0	0	0	0	0	0
CDA Lake	0	0	0	0	0	0	0
Carlin	0	0	0	0	0	0	0
Chain Lakes	0	0.5	0.5	0.5	0.5	0	0.5
Fernan Lake	0	0	0	0	0	0	0
Fourth of July	0	0	0	0	0	0	0
Hart	0	0	0	0	0	0	0
Hayden Lake	0.4	0.8	0.8	3.3	0.8	0.4	5.0
Cedar	0	0	0	0	0	0	0
Nettleton	0	0	0	0	0	0	0
Scott	0	0	0	0	0	0	0
Steamboat	0	0	0	0	0	0	1.2
Wolf Lodge	0	0	0	0	0	0	0

Reduced Length of Encroaching Roads: Alternatives that reduce the length of encroaching roads would have a short-term increase in sediment but would result in the long-term benefit to Management Indicator Species.

Alternatives D and G remove the largest amount of roads encroaching on riparian habitat and flood prone areas, followed by Alternatives B, C and E. In the short term, there would be an increase in fine sediment and reduction in cover where the road prism is currently in contact with the stream. Reduction of this encroachment in the long term, would allow the stream courses to settle into a regime where the stream course would be able to interact with the flood plain. Large wood recruitment would improve over time as these areas regenerate to forest and provide fallen trees into the stream and riparian areas. Habitat complexity would increase and provide more pool and hiding/resting habitat for fish. There would be an immediate short term increase with the addition of wood during the removal of the road and long term increase with the recovery of the riparian area. Sediment would slowly go into storage behind these obstructions, and should result in less bedload movement through the system. The short-term increase in sediment delivery in combination with the long-term benefit associated with the removal of encroaching roads would not result in a significant cumulative effect to the Management Indicator Species within the 15 cumulative watershed effect areas. Given the amount of encroaching roads within the cumulative effects areas, the benefits of restoration activities would be minimal, but are a necessary first step towards restoration of watersheds.

Table III-73. Reduction of encroaching roads (approximate miles) by alternative.

Watershed	Alt. A ST	Alt. A LT	Alt. B ST	Alt. B LT	Alt. C ST	Alt. C LT	Alt. D ST	Alt. D LT	Alt E ST	Alt E LT	Alt F ST	Alt F LT	Alt G ST	Alt G LT
Beauty	nc	0	s	1.2	s	1.2	s	1.2	s	1.2	nc	0	s	1.2
Beaver	s	0.3	nc	0.3	nc	0.3	nc	0.3	nc	0.3	nc	0.3	nc	0.3
Bumblebee	nc	0	nc	0	nc	0	nc	0	nc	0	nc	0	nc	1.2
CDA Lake	nc	0	nc	0	nc	0	nc	0	nc	0	nc	0	nc	0
Carlin	nc	0	nc	0	nc	0	nc	0	nc	0	nc	0	nc	0
Chain Lakes	nc	0	s	0.5	s	0.5	s	0.5	s	0.5	nc	0	s	0.5
Fernan	nc	0	s	0.8	s	0.8	s	0.8	s	0.8	s	0.8	s	0.8
Fourth of July	nc	0	nc	0	nc	0	nc	0	nc	0	nc	0	nc	0
Hart	nc	0	nc	0	nc	0	nc	0	nc	0	nc	0	nc	0
Hayden Lake	nc	0	s	1.9	s	1.9	s	2.4	s	1.9	nc	1.9	s	3.1
Cedar	nc	0	nc	0	nc	0	nc	0	nc	0	nc	0	nc	0
Nettleton	nc	0	nc	0	nc	0	nc	0	nc	0	nc	0	nc	0
Scott	nc	0	nc	0	nc	0	nc	0	nc	0	nc	0	s	1.8
Steamboat	nc	0	nc	0	nc	0	s	0	nc	0	nc	0	s	0
Wolf Lodge	nc	0	nc	0	nc	0	nc	0	nc	0	nc	0	nc	0

LT (long term) = miles of encroaching roads reduced.
ST (short term) = a short-term increase in sediment; "nc" means there would be no change, "s" means there would be a short-term change.

Effects on Westslope Cutthroat Trout and Bull Trout Individuals and Populations

Definitions

The impact to Management Indicator Species is described using the following definitions:

No change in population conditions means that there would likely be no net positive or negative effect to the population within the cumulative watershed effects areas. No change in riparian or stream conditions.

Likely to result in a long-term reduction in risk of past management actions to individuals indicates the action taken within the watershed is limited in nature but would result in a net benefits to individuals when compared to the existing condition. Actions that result in the reduction of risk to individuals include isolated culvert upgrades and small scale reduction of encroaching roads with little increased risk associated with road building or riparian harvest. A change in stream and riparian conditions so that Riparian Management Objective are trended towards at the segment or reach scale.

Likely to result in a long term reduction in risk of past management actions to population indicates the actions is broad enough in scope to effect individuals throughout the basin thereby improving the condition of the population within the cumulative watershed effects area when compared to the existing conditions. Actions that result in the reduction of risk to populations include widespread culvert upgrades, large scale reduction of encroaching roads, and/or increased fish passage without increased risk associated with road building or riparian harvest. A significant change in stream and riparian conditions so that Riparian Management Objective are trended towards at the subwatershed scale.

Likely to result in a long-term risk in individuals indicates the action taken within the watershed is limited in nature but would result in a net harm to individuals when compared to the existing condition. Actions that result in the increased of risk to individual include road building or harvesting riparian areas without a widespread effort to upgrade culverts and reduction of encroaching roads. A change in stream and riparian conditions so that Riparian Management Objective are trended away from at the segment or reach scale.

Likely to result in a long-term decline in populations indicates the action taken within the watershed is widespread and would result in a net harm to individuals when compared to the existing condition. Actions that result in the increased of risk to populations include widespread road building without a widespread effort to upgrade culverts and the reduction of encroaching roads. A change in stream and riparian conditions so that Riparian Management Objective are trended away from at the subwatershed scale.

Determination of Effects to Management Indicator Species

The following tables portray effects of the ongoing and proposed activities (including the reasonably foreseeable activities, described in Appendix E), and are designed to show the trend that would be attained with each of the alternatives, by watershed analysis area. These calls integrate the preceding evaluations of habitat components and the foreseeable actions described above. The "X" indicates the composite rating of the cumulative effects of the all actions in an alternative on the Management Indicator Species and summarized by the cumulative watershed effects areas.

Table III-74. Effects to Management Indicator Species, ALTERNATIVE A.

Watershed	Likely to result in a long term decline in populations	Likely to result in a long term risk in individuals	No change in population conditions	Likely to result in a long term reduction in risk of past management actions to individuals	Likely to result in a long term reduction in risk of past management actions to population	No WCT recently found within basin	No BT recently found within Basin	DIRECT AND INDIRECT EFFECTS (Positive Components	DIRECT AND INDIRECT EFFECTS (Negative Components)
Beauty			X				X		
Beaver				X			X	Removal/upgrade of 59 channel crossings, encroaching road	Short term sediment increase
Bumblebee			X				X		
Coeur d'Alene Lake			X				In CDA Lake		
Carlin				X			X	Removal/upgrade of 19 channel crossings	Short term sediment increase
Chain Lakes				X			In CDA River	Removal/upgrade of 28 channel crossings	Short term sediment increase
Fernan Lake			X				X		
Fourth of July				X				Removal/upgrade of 33 channel crossings	Short term sediment increase
Hart			X				In CDA River		
Hayden Lake			X				X		
Cedar			X				X		
Nettleton			No MIS			X	X		
Scott			X				X		
Steamboat			X				X		
Wolf Lodge			X				X	Removal /upgrade of 20 channel crossings	Short term sediment increase,

Cumulative Effects

Alternative A: Historically, all the above listed basins, except Nettleton Gulch, had abundant populations of cutthroat trout and all but one (Hayden Lake likely had no access) had abundant populations of bull trout. Currently, only Steamboat and Hayden Lake tributaries have strong populations of cutthroat and none has a viable population of bull trout. The population trend of these cutthroat was in a rapid decline but now appears to be stabilizing. In basins with large amounts of private land ownership in the largest fish bearing portions of the watersheds (Beaver, CDA Lake, Carlin, Chain Lakes, Fernan Lake and Wolf Lodge), adfluvial cutthroat populations would likely be negatively affected as these private land owners continue to dike these stream channels, harvest timber, mine and construct roads associated with this activity.

The effect of the no action alternative would result in no change or slightly improved changes in the current condition or trend in the Management Indicator Species in 10 watersheds - which is a stable population of cutthroat in basins where private land owners have limited influence, a declining population of adfluvial cutthroat in basins where private land owners alter stream channels, and a non-viable population of bull trout. The No-Action Alternative would not increase the level of risk to these species with any timber harvesting, but would slightly improves the condition through restoration.

Reasonably foreseeable activities that will occur would not have any negative incremental effect that would result in a cumulative effect to any of the watersheds The effects to fish under Alternatives B, C, D, and E would be similar and overall positive. Because of varying risk to fish as a result of harvest and road construction under these four alternatives, Alternative C would be the best for the Management Indicator Species, followed by Alternatives E, B, and D, respectively. All four of these alternatives would be better than either Alternatives A or F. The best alternative from a fisheries perspective would be Alternative G. At the watershed scale, Alternatives A and G would be the best alternatives for the Bumblebee watershed.

Table III-75. Effects to Management Indicator Species, ALTERNATIVE B.

Watershed	Likely to result in a long term decline in populations	Likely to result in a long term risk in individuals	No change in popula-tion conditions	Likely to result in a long term reduction in risk of past management actions to individuals	Likely to result in a long term reduction in risk of past management actions to population	No WCT recently found within basin	No BT recently found within Basin	DIRECT AND INDIRECT EFFECTS (Positive Components)	DIRECT AND INDIRECT EFFECTS (Negative Components)
Beauty				X			X	Reduced sediment risk, reduced encroachments, increased fish access	Increased short-term sediment,
Beaver				X			X	Reduced sediment risk	Increased riparian harvest in Category 2 stream, increased short-term sediment
Bumblebee		X					X	Reduced sediment risk (11%)	Increased short-term sediment, increased riparian harvest in Category 4 stream
Coeur d'Alene Lake			X				In CDA lake	Reduced long term sediment risk (12%)	
Carlin				X			X	Reduced long term sediment risk (127%)	
Chain Lakes				X			In CDA River	Reduced road encroachment reduced long term sediment risk (338%), increased fish access	Increased riparian harvest in Category 4 streams, increased short-term sediment
Fernan Lake				X			X	Reduced long-term sediment risk (122%), reduced road encroachment	Increased riparian harvest in Category 2 and 4 streams, increased short-term sediment
Fourth of July			X				X		
Hart			X				In CDA River		Increased riparian harvest in Category 4 streams, increased short-term sediment
Hayden Lake				X			X	Increased fish access, decreased long-term sediment risk, decreased road encroachment	Increased riparian harvest in Category 1, 2, and 4 streams, increased short-term sediment,
Cedar			X				X		
Nettleton			No MIS			X	X		
Scott			X					No activity	
Steamboat			X				X	Reduced long-term sediment risk 14%	Short term increase sediment
Wolf Lodge				X			X	Reduced long-term sediment risk 193%	

Alternative B: Historically, all the above listed basins, except Nettleton Gulch, had abundant populations of cutthroat trout and all but one (Hayden Lake likely had no access) had abundant populations of bull trout. Currently only Steamboat and Hayden Lake tributaries have strong populations of cutthroat and none has a viable population of bull trout. The population trend of these cutthroat was a rapid decline in the early and mid-1900's, but now appears to be stabilizing. In basins with large amounts of private land ownership, adfluvial cutthroat populations would likely continue to be negatively affected in the largest fish-bearing streams within the watersheds (Beaver, CDA Lake, Carlin, Chain Lakes, Fernan Lake and Wolf Lodge) as these private land owners continue to dike stream channels, harvest timber, mine and construct roads associated with this activity.

Alternative B would result in an increased risk to individuals at the scale of a stream segment in one watershed, Bumblebee. Alternative B would result in no change in population condition at the scale of a stream segment in Coeur d'Alene, Fourth of July, Cedar, Scott, Steamboat and Hart watersheds. The restoration activities in seven of the basins (Beauty, Beaver, Carlin, Chain Lakes, Fernan, Hayden Lake, and Wolf Lodge) should trend habitat conditions in a manner that benefits the Management Indicator Species. Because the actions only have effects at the scale of a stream reach, this project would have no incremental effect at the scale of the watershed.

Although there is no cumulative effects from this project at the watershed scale, the overall effects of this project in combination with the past, present and reasonably foreseeable actions would be to maintain or increase the rate at which the Management Indicator Species recover within the project area. The effects to fish under Alternative B would be similar to those under Alternatives C, D, and E. Because of varying risk to fish related to harvest and road construction under these four alternatives, Alternative C would be the best for the Management Indicator Species, followed by Alternatives E, B, and D, respectively. All four of these alternatives would be better than either Alternatives A or F. The best alternative from a fisheries perspective would be Alternative G.

Table III-76. Effects to Management Indicator Species, ALTERNATIVE C

Watershed	Likely to result in a long term decline in populations	Likely to result in a long term risk in individuals	No change in population conditions	Likely to result in a long term reduction in risk of past management actions to individuals	Likely to result in a long term reduction in risk of past management actions to population	No WCT recently found within basin	No BT recently found within Basin	DIRECT AND INDIRECT EFFECTS (Positive Components)	DIRECT AND INDIRECT EFFECTS (Negative Components)
Beauty				X			X	Decrease long term sediment risk (107%), reduced encroachment, increased fish access	Increased short term sediment,
Beaver				X			X	Decrease in long term sediment risks (125%)	
Bumblebee		X					X		Increase short term sediment
Coeur d'Alene Lake			X				In CDA lake		
Carlin				X			X	Decrease in long term sediment risks (127%)	
Chain Lakes				X			In CDA River	Reduced road encroachment, decrease in long term sediment risks (341%)	Increase short term sediment
Fernan Lake				X			X	Reduced road encroachment, decreased long term sediment risk (127%)	Increase short term sediment
Fourth of July			X						
Hart			X				In CDA River		
Hayden Lake				X			X	Increased fish access, decreased long term sediment risk (130%)	
Cedar			X				X		
Nettleton			Non fisheries			X	X		
Scott			X					No Activity	
Steamboat			X				X	Reduced long term sediment risk (14%)	
Wolf Lodge				X			X	Reduced long term sediment risk (195%)	

Alternative C: Historically, all the basins listed above, except Nettleton Gulch, had abundant populations of cutthroat trout and all but one had abundant populations of bull trout (Hayden Lake likely had no access). Currently only Steamboat and Hayden Lake tributaries have strong populations of cutthroat and none has a viable population of bull trout. The population trend of these cutthroat was a rapid decline in the early and mid-1900's, but now appears to be stabilizing. In basins with large amounts of private land ownership, adfluvial cutthroat populations would likely continue to be negatively affected in the largest fish-bearing streams within the watersheds (Beaver, CDA Lake, Carlin, Chain Lakes, Fernan Lake and Wolf Lodge) as private land owners continue to dike stream channels, harvest timber, mine and construct roads associated with these activities.

Alternative C would result in an increased risk to individuals at the scale of a stream segment in one watershed (Bumblebee). There would be no change in the current condition or trend in the Management Indicator Species in five basins, which is a stable population of cutthroat in basins where private land owners have limited influence, a declining population of adfluvial cutthroat in basins where private land owners alter stream channels, and a non-viable population of bull trout. The restoration activities in seven of the basins (Beauty, Beaver, Carlin, Chain Lakes, Fernan Lake, Hayden Lake, and Wolf Lodge) should trend habitat conditions in a manner that benefits the Management Indicator Species. Because the actions only have effects at the scale of a stream reach, this project would have no incremental effect at the scale of the watershed.

Although there is no cumulative effect of this project at the watershed scale, the overall effects of this project in combination with the past, present and reasonably foreseeable actions would be to maintain or increase the rate at which the Management Indicator Species recover within the project area. The effects to fish under Alternative C would be similar to those under Alternatives B, D, and E (generally positive). Because of varying risk to fish as a result of harvest and road construction under these four alternatives, Alternative C would be the best for the Management Indicator Species, followed by Alternatives E, B, and D, respectively. All four of these alternatives would be better than either Alternatives A or F. The best alternative from a fisheries perspective would be Alternative G.

Table III-77. Effects to Management Indicator Species, ALTERNATIVE D.

Watershed	Likely to result in a long term decline in populations	Likely to result in a long term risk in individuals	No change in population conditions	Likely to result in a long term reduction in risk of past management actions to individuals	Likely to result in a long term reduction in risk of past management actions to population	No WCT recently found within basin	No BT recently found within Basin	DIRECT AND INDIRECT EFFECTS (Positive Components)	DIRECT AND INDIRECT EFFECTS (Negative Components)
Beauty				X			X	Reduced long term sediment risk, reduced encroachment, increased fish access	Increased short term sediment,
Beaver			X				X	Reduced long term sediment risk	Increased riparian harvest in Category 2 or 4 RHCA, increased short-term sediment risk, increase road miles and channel crossings
Bumblebee		X					X		Increased short term sediment risk, increased riparian harvest in Category 4 RHCA
Coeur d'Alene Lake			X				In CDA lake	Decrease long term sediment risk (11%)	Increased short term sediment risk, increased riparian harvest in Category 4 RHCA,
Carlin				X			X	Decrease long term sediment risk (127%)	
Chain Lakes				X			In CDA River	Reduced road encroachment decrease long term sediment risk (337%), increased fish access	Increase short term sediment, riparian harvest cat 4 RHCAs
Fernan Lake				X			X	Reduced road encroachment decrease long term sediment risk (122%)	Increased short-term sediment, no change , increased riparian harvest in Category 2 or 4 RHCA
Fourth of July			X						
Hart			X				In CDA River		Increased short-term sediment risk, increased riparian harvest in Category 4 RHCA,
Hayden Lake				X			X	Increased fish access, decreased long term sediment risk (183%), reduced road encroachment	Increased short term sediment risk, increased riparian harvest in Category 2 or 4 RHCA's
Cedar			X				X		
Nettleton			Non Fisheries			X	X		
Scott			X				X	No activity	
Steamboat			X				X	Decrease long term sediment risk (14%)	Increased short term sediment risk
Wolf Lodge				X			X	Decrease long term sediment risk (220%)	Increased short term sediment , increased riparian harvest in Category 2 or 4 RHCA's,

Alternative D: Historically, all the above listed basins, except Nettleton Gulch, had abundant populations of cutthroat trout and all but one had abundant populations of bull trout (Hayden Lake likely had no access). Currently only Steamboat and Hayden Lake tributaries have strong populations of cutthroat and none has a viable population of bull trout. The population trend of these cutthroat was a rapid decline in the early and mid-1900's, but now appears to be stabilizing. In basins with large amounts of private land ownership, adfluvial cutthroat populations would likely continue to be negatively affected in the largest fish-bearing streams within the watersheds (Beaver, CDA Lake, Carlin, Chain Lakes, Fernan Lake and Wolf Lodge) as private land owners continue to dike stream channels, harvest timber, mine and construct roads associated with these activities.

Alternative D would result in an increased risk to individuals at the scale of a stream segment in one watershed (Bumblebee). This is primarily the result of riparian harvest and additional stream crossings. There would be no change in the current condition or trend in the Management Indicator Species in seven basins, which is a stable population of cutthroat in basins where private land owners have limited influence, a declining population of adfluvial cutthroat in basins where private land owners alter stream channels, and a non-viable population of bull trout. The restoration activities in six of the basins (Beauty, Carlin, Chain Lakes, Fernan, Hayden Lake, and Wolf Lodge) should trend habitat conditions in a manner that benefits Management Indicator Species.

Although there would be no cumulative effect of this project at the watershed scale, the overall effects of this project in combination with the past, present and reasonably foreseeable actions would be to maintain or increase the rate at which the Management Indicator Species recover within the project area. The effects to fish under Alternative D would be similar to those under Alternatives B, C, and E; all generally positive. Because of varying risk to fish as a result of harvest and road construction under these four alternatives, Alternative C would be the best for the Management Indicator Species, followed by Alternatives E, B, and D, respectively. All four of these alternatives would be better than either Alternatives A or F. The best alternative from a fisheries perspective would be Alternative G.

Table III-78. Effects to Management Indicator Species, ALTERNATIVE E.

Watershed	Likely to result in a long term decline in populations	Likely to result in a long term risk in individuals	No change in population conditions	Likely to result in a long-term reduction in risk of past management actions to individuals	Likely to result in a long term reduction in risk of past management actions to population	No WCT recently found within basin	No BT recently found within Basin	DIRECT AND INDIRECT EFFECTS (Positive Components)	DIRECT AND INDIRECT EFFECTS (Negative Components)
Beauty				X			X	Reduced long term sediment risk, reduced encroachment, increased fish access	Increased short-term sediment,
Beaver				X			X	Reduced long term sediment risk	Increased riparian harvest in Category 2 or 4 RHCA, increased short term sediment risk, increase road miles and channel crossings
Bumblebee		X					X		Increased short term sediment risk, increased riparian harvest in Category 4 RHCA
Coeur d'Alene Lake			X				In CDA lake	Decrease long term sediment risk (12%)	Increased short-term sediment risk, increased riparian harvest in Category 4 RHCA,
Carlin				X			X	Decrease long term sediment risk (127%)	
Chain Lakes				X			In CDA River	Reduced road encroachment decrease long term sediment risk (338%) increased fish access	Increase short term sediment, riparian harvest cat 4 RHCAs
Fernan Lake				X			X	Reduced road encroachment decrease long term sediment risk (122%)	Increased short-term sediment, no change, increased riparian harvest in Category 2 or 4 RHCA
Fourth of July			X						
Hart			X				In CDA River		Increased short term sediment risk, increased riparian harvest in Category 4 RHCA,
Hayden Lake				X			X	Increased fish access, decreased long-term sediment risk (130%), reduced road encroachment	Increased short-term sediment risk, increased riparian harvest in Category 2 or 4 RHCA's
Cedar			X				X		
Nettleton			Non Fisheries			X	X		
Scott			X				X	No activity	
Steamboat			X				X	decrease long term sediment risk (14%)	Increased short term sediment risk
Wolf Lodge				X			X	decrease long term sediment risk (193%)	Increased short term sediment , increased riparian harvest in Category 2 or 4 RHCA's,

Alternative E: Historically, all the above listed basins, except Nettleton Gulch, had abundant populations of cutthroat trout and all but one had abundant populations of bull trout (Hayden Lake likely had no access). Currently only Steamboat and Hayden Lake tributaries have strong populations of cutthroat and none has a viable population of bull trout. The population trend of these cutthroat was a rapid decline in the early and mid-1900's, but now appears to be stabilizing. In basins with large amounts of private land ownership adfluvial cutthroat populations would likely continue to be negatively affected in the largest fish-bearing streams within the watersheds (Beaver, CDA Lake, Carlin, Chain Lakes, Fernan Lake and Wolf Lodge) as private land owners continue to dike stream channels, harvest timber, mine and construct roads associated with these activities.

Alternative E would result in an increased risk to individuals at the scale of a stream segment in one watershed (Bumblebee). This is primarily the result of riparian harvest and additional stream crossings. There would be no change in the current condition or trend in the Management Indicator Species in six watersheds, which is a stable population of cutthroat in basins where private land owners have limited influence a declining population of adfluvial cutthroat in basins where private land owners alter stream channels, and a non-viable population of bull trout. The restoration activities in seven of the basins (Beauty, Beaver Carlin, Chain Lakes, Fernan, Hayden Lake, and Wolf Lodge) should trend habitat conditions in a manner that benefits the Management Indicator Species. Because the actions only have effects at the scale of a stream reach this project would have no incremental effect at the scale of the watershed.

Although there would be no cumulative effect of this project at the watershed scale, the overall effects of this project in combination with the past, present and reasonably foreseeable actions would be to maintain or increase the rate at which the Management Indicator Species recover within the project area. The effects to fish under Alternative E would be similar to those under Alternatives B, C, and D; all positive. Because of varying risk to fish as a result of harvest and road construction under these four alternatives, Alternative C would be the best for the Management Indicator Species, followed by Alternatives E, B, and D, respectively. All four of these alternatives would be better than either Alternatives A or F. The best alternative from a fisheries perspective would be Alternative G.

Table III-79. Effects to Management Indicator Species, ALTERNATIVE F.

Watershed	Likely to result in a long-term decline in populations	Likely to result in a long term risk in individuals	No change in population conditions	Likely to result in a long term reduction in risk of past management actions to individuals	Likely to result in a long term reduction in risk of past management actions to population	No WCT recently found within basin	No BT recently found within Basin	DIRECT AND INDIRECT EFFECTS (Positive Components)	DIRECT AND INDIRECT EFFECTS (Negative Components)
Beauty			X				X		
Beaver				X			X	Decrease long term sediment risk (123%)	Increased short term sediment
Bumblebee		X					X		
Coeur d'Alene Lake			X				In CDA lake		Increased short-term sediment, increase long term sediment risk, increased riparian harvest in Category 4 RHCA
Carlin				X			X	Decrease long term sediment risk (127%)	
Chain Lakes				X			In CDA River	Decrease long term sediment risk (122%)	Increased short term sediment risk
Fernan Lake				X			X	Decrease long term sediment risk (122%) decrease encroaching roads	Increased short term sediment, increased riparian harvest in Category 2 or 4 streams
Fourth of July			X						
Hart			X				In CDA River		
Hayden Lake				X			X	Decrease long term sediment risk (128%)	Increased short term sediment, increased riparian harvest in Category 2 or 4 RHCA's
Cedar			X				X		
Nettleton			Non Fisheries			X	X		
Scott			X					No activity	
Steamboat			X				X		
Wolf Lodge				X			X	Decrease long term sediment risk (193%)	Increased short term sediment risk,

Alternative F: Historically, all the above listed basins, except Nettleton, had abundant populations of cutthroat trout and all but one had abundant populations of bull trout (Hayden Lake likely had no access). Currently only Steamboat and Hayden Lake tributaries have strong populations of cutthroat and none has a viable population of bull trout. The population trend of these cutthroat was a rapid decline in the early and mid-1900's, but now appears to be stabilizing. In basins with large amounts of private land ownership, adfluvial cutthroat populations would likely continue to be negatively affected in the largest fish-bearing streams within the watersheds (Beaver, CDA Lake, Carlin, Chain Lakes, Fernan Lake and Wolf Lodge) as private land owners continue to dike stream channels, harvest timber, mine and construct roads associated with these activities.

Alternative F would result in an increased risk to individuals at the scale of a stream segment in one watershed (Bumblebee). This is primarily the result of riparian harvest and additional stream crossings. There would be no change in the current condition or trend in the Management Indicator Species in 7 watersheds, which is a stable population of cutthroat in basins where private land owners have limited influence, a declining population of adfluvial cutthroat in basins where private land owners alter stream channels, and a non-viable population of bull trout. The restoration activities in six of the basins (Beaver, Carlin, Chain Lakes, Fernan, Hayden Lake, and Wolf Lodge) should trend habitat conditions in a manner that benefits the Management Indicator Species. Because the actions only have effects at the scale of a stream reach this project would have no incremental effect at the scale of the watershed.

Although there would be no cumulative effect of this project at the watershed scale the overall effects of this project in combination with the past, present and reasonably foreseeable actions would be to maintain or increase the rate at which the Management Indicator Species recovered within the project area. The effects to fish under Alternative E would be similar to those under Alternatives B, C, and D; all positive. Because of varying risk to fish as a result of harvest and road construction under these four alternatives, Alternative C would be the best for the Management Indicator Species, followed by Alternatives E, B, and D, respectively. All four of these Alternatives would be better than either Alternatives A or F. The best alternative from a fisheries perspective would be Alternative G.

Table III-80. Effects to Management Indicator Species, ALTERNATIVE G.

Watershed	Likely to result in a long-term decline in populations	Likely to result in a long-term risk in individuals	No change in population conditions	Likely to result in a long-term reduction in risk of past management actions to individuals	Likely to result in a long term reduction in risk of past management actions to population	No WCT recently found within basin	No BT recently found within Basin	DIRECT AND INDIRECT EFFECTS (Positive Components)	DIRECT AND INDIRECT EFFECTS (Negative Components)
Beauty				X			X	Decrease long term sediment risk (134%), reduced encroachment, increased fish access	
Beaver				X			X	Decrease in long term sediment risks (133%)	
Bumblebee			X				X		
Coeur d'Alene Lake				X			In CDA lake		
Carlin				X			X	Decreased long-term sediment risk (133%)	
Chain Lakes				X			In CDA River	Reduced road encroachment, decreased long term sediment risk (405%), increased fish access	
Fernan Lake				X			X	Reduced road encroachment, decreased long term sediment risk (126%)	
Fourth of July			X						
Hart				X			In CDA River	Decreased long term sediment risk (45%)	
Hayden Lake				X			X	Increased fish access, decreased long term sediment risk (321%)	
Cedar			X				X	Decreased long-term sediment risk (8%)	
Nettleton			No Fish			X	X		
Scott			X					No activity	
Steamboat				X			X	Decreased long term sediment risk (43%)	
Wolf Lodge				X			X	Decreased long term sediment risk (237%)	

Alternative G: Historically, all the above listed basins, except Nettleton Gulch, had abundant populations of cutthroat trout and all but one had abundant populations of bull trout (Hayden Lake likely had no access). Currently only Steamboat and Hayden Lake tributaries have strong populations of cutthroat and none has a viable population of bull trout. The population trend of these cutthroat was a rapid decline in the early and mid-1900's, but now appears to be stabilizing. In basins with large amounts of private land ownership adfluvial cutthroat populations would likely continue to be negatively affected in the largest fish-bearing streams within the watersheds (Beaver, CDA Lake, Carlin, Chain Lakes, Fernan Lake and Wolf Lodge) as private land-owners continue to dike stream channels, harvest timber, mine and construct roads associated with these activities.

Alternative G would result in a decreased risk to individuals at the scale of a stream segment in the Coeur d'Alene watershed. This is primarily the result of increased road and channel restoration, resulting in increased fish passage and improved channel conditions. There would be little change in the current condition or trend in the Management Indicator Species, which is a stable population of cutthroat in basins where private land owners have limited influence, a declining population of adfluvial cutthroat in basins where private land owners alter stream channels, and a non-viable population of bull trout. The restoration activities in 10 of the basins should trend habitat conditions in a manner that benefits the Management Indicator Species. Because the actions only have effects at the scale of a stream reach, this project would have no incremental effect at the scale of the watershed.

Although there would be no cumulative effect of this project at the watershed scale, the overall effects of this project in combination with the past, present and reasonably foreseeable actions would be to maintain or increase the rate at which the Management Indicator Species recover within the project area. The effects to fish in Alternative G focus on watershed restoration and take less risk than the alternatives that harvest timber. Alternative B, C, D, and E are similar; all positive. Because of varying risk to fish as a result of harvest and road construction under these four alternatives, Alternative C would be the best for the Management Indicator Species, followed by Alternatives E, B, and D, respectively. All four of these alternatives would be better than either Alternatives A or F. The best alternative from a fisheries perspective would be Alternative G.

Effects of Opportunities

Additional watershed restoration projects (such as road obliteration, removal or improvement of stream crossings and placement of instream structures to benefit fish habitat) have the opportunity to be funded with this project. These projects could result in the short term increase in sediment, but in the long term, would benefit the Management Indicator Species. All future projects must be designed to meet the Forest Plan as amended by the Inland Native Fish Strategy and be reviewed by the District Fisheries Biologist prior to implementation.

Treatment of noxious weeds would have no effect on the Management Indicator Species; treatments would follow standards that minimize risk to riparian vegetation and aquatic species.

Timber stand improvement would have no effect, if conducted outside stream buffers.

Consistency with the Forest Plan and Other Applicable Regulatory Direction

Based on the information presented in this document, the alternatives would meet the Forest Plan as amended by the Inland Native Fish Strategy as well as other laws intended to maintain or restore fish populations.

FUELS AND FIRE BEHAVIOR

CHANGES BETWEEN THE DRAFT AND FINAL EIS

In response to comments and in recognition of errors in the DEIS, the FEIS has changes in the fuels and fire behavior section. A brief summary of the changes are as follows: The Affected Environment section of the Coeur d'Alene project area has been expanded to better describe the historic conditions and the actions that led to current forest health problems. Additional analysis was completed for the FEIS. The Forest Vegetation Simulator (FVS) was used. The Fire and Fuels Extension (FFE-FVS) integrates Forest Vegetation Simulator with elements from existing models of fire behavior and fire effects. Model output displays fuels, stand structure, snags, and potential fire behavior over time and provides a basis for comparing proposed fuel treatments. Many wording and other editing changes have taken place to further clarify the descriptions of information provided. Alternatives F and G have been added and analyzed in response to comments. There is expansion on the description of cumulative effects, foreseeable actions, and opportunities.

REGULATORY FRAMEWORK

The IPNF Forest Plan objective is to implement efficient fire protection and use programs based on management objectives, site specific conditions, and expected fire occurrence and behavior. Fire management plans are to be guided by the following standards:

- *Management area standards and goals provide direction for appropriate response.*
- *Human life and property will be protected.*
- *The appropriate suppression response for designated old-growth stands in all management areas except in wilderness will result in prevention of old growth loss.*
- *Activity fuels will be treated to reduce their potential rate of spread and fire intensity so the planned initial attack organization can meet initial attack objectives.*

The primary Forest Plan Management Areas with the Coeur d'Alene Beetle Project Area include goals to manage suitable lands for timber production for the long-term growth and production of commercially valuable wood products. The fire protection standard to achieve that goal is to use initial attack strategies (confine, contain and control) appropriate to achieve the best benefit based on commercial timber values and where appropriate, big game winter range values.

Forest Service Manual (FSM) 5150, defines fuel as combustible wildland vegetative materials, living or dead. Agency direction is to evaluate, plan and treat wildland fuel to control flammability and reduce resistance to control including mechanical, chemical, biological, or manual means (FSM 5150). This includes the use of prescribed fire to support land and resource management objectives.

The objectives of fuels management are to:

- *Reduce fire hazard to a level where cost effective resource protection is possible should a wildfire ignition occur. Fire hazard is the potential fire behavior (intensity and rate of spread) of a fire burning in a given fuel profile and its ability to be suppressed by firefighting forces.*

- *Reduce the potential fire severity.*

Fire suppression policy from the early 1900's until the late 1970's has been that of total suppression. Only recently has fire policy been modified to recognize the importance of fire in balancing vegetation cycles within the temperate forest. The Federal Wildland Fire Management Policy and Program Review was chartered by the Secretaries of the Interior and Agriculture to examine the need for modification of and addition to Federal

fire policy. The review recommended a set of consistent policies for all Federal wildland fire management agencies. In adopting the policy, the Federal Agencies recognized that wildfire has historically been a major force in the evolution of our wildlands, and it must be allowed to continue to play its natural role wherever possible. It was also recognized that all Agencies will not necessarily employ all identified procedures on all administrative units at all times (USDI, USDA, 1995; USDI, USDA, 1996). The severe wildfire seasons in northern California and Oregon in 1987, in Yellowstone Park, and the Northern Rocky Mountains in 1988, throughout much of the West in 1994, and Florida and Texas in 1998 have made it clear that fire cannot be excluded from fire-dependent ecosystems. On the other hand, because of developed areas, and commercial forests, fire cannot be fully restored to its historic character, except perhaps in a few of the largest wilderness areas (USDA, 1996.)

AFFECTED ENVIRONMENT

Fire is the major disturbance factor that produces vegetation changes in our ecosystems. If the role of fire is altered, or removed, this will produce significant changes in the ecosystem. Fire has burned in every ecosystem and virtually every square meter of the coniferous forests and summer-dry mountainous forests of northern Idaho, western Montana, eastern Washington and adjacent portions of Canada. Fire was responsible for the widespread occurrence and even the existence of western larch, lodgepole pine, and western white pine. Fire maintained ponderosa pine throughout its range at the lower elevations and kills ever-invading Douglas-fir and grand fir (Spurr and Barnes 1980). Many ecosystems are regularly recycled by fire; life for many forest species literally begins and ends with fire. The effects of the historic disturbance factors, mostly associated with fire, and their current absence are discussed in more detail the Vegetation Section.

In the discussion that follows "severity" refers to the amount of damage a fire actually causes and "return interval" refers to how often a particular type of fire occurs. Here is a summary of the types of fires that occur in forested ecosystems:

- **Nonlethal fires** - fires that kill 10% or less of the dominant tree canopy. A much larger percentage of small understory trees, shrubs and forbs may be burned back to the ground line. These are commonly low severity surface and understory fires, often (but not always) with short return intervals (few decades).

- **Mixed severity fires** - fires that kill more than 10%, but less than 90% of the dominant tree canopy. These fires are commonly patchy, irregular burns, producing a mosaic of different burn severities. Return intervals on mixed severity fires may be quite variable.

- **Lethal fires** - fires that kill 90% or more of the dominant tree canopy. These are often called "stand-replacing" fires and they often burn with high severity. They are commonly (but not always) crown fires. In general (but not always), lethal fires have long return intervals (140-250+ years apart), but affect large areas when they do occur. Local examples of these types of fires would be the Sundance and Trapper Peak fires of 1967 that burned over 80,000 acres in a relatively short time period during late summer drought conditions.

The Coeur d'Alene drainage historically had a variable fire regime of long interval large lethal fires mixed with shorter return interval non lethal and mixed severity fires. Fires were more frequent in watersheds on the periphery of the Coeur d'Alene Basin, adjacent to and downwind from the drier pine dominated Rathdrum Prairie (Zack and Morgan, 1994).

The fire history analysis of the Coeur d'Alene Basin conducted by Zack and Morgan in 1994 drew the following conclusions:

- *In addition to cycling carbon and nutrients, the infrequent large lethal fires played a dominant role in resetting the successional sequence and structuring the vegetation matrix across the landscape. However, the nonlethal and mixed severity fires were also important. Most stands (within the Coeur d'Alene Basin) apparently experienced an average of one to three of these low severity burns between lethal fires. These lower severity fires would reduce ground fuels, reduce ladder fuels, thin stands, and favor larger individuals of fire resistant species (larch, Douglas-fir, and ponderosa pine), than if these mixed severity and nonlethal fires had not occurred.*

- *Lower severity fires structured how the landscape responded when a lethal severity fire did occur. The lower severity fires increased the proportion of the landscape with big trees and open canopies that would not sustain a crown fire. Reduction of ladder fuels would mean that even high intensity fire might not reach tree canopies in some cases. The larger trees that grew as a result of the thinning would be more likely to survive even intense fires. The net result would be that even mostly lethal severity fires would be likely to leave more individual residual trees and patches of residual trees than if the lower severity fires had not occurred. The effects of lethal fire events would be less uniform as a result of the lower severity fires*

- *Regional climate change operating on the scale of decades and centuries may be implicated in the major fire patterns observed. The historical record shows that some relatively recent fires were quite large. In particular, the 1919, 1910, and 1889 burns were very large and severe both in the Coeur d'Alene Basin and throughout the Northern Rocky Mountains. Other dates such as 1542, 1738, 1764, 1772, 1814, 1830, and 1859 appear to be regional episodes. This strongly suggests that regional climate patterns are responsible for many of the major fire episodes on the Coeur d'Alene.*

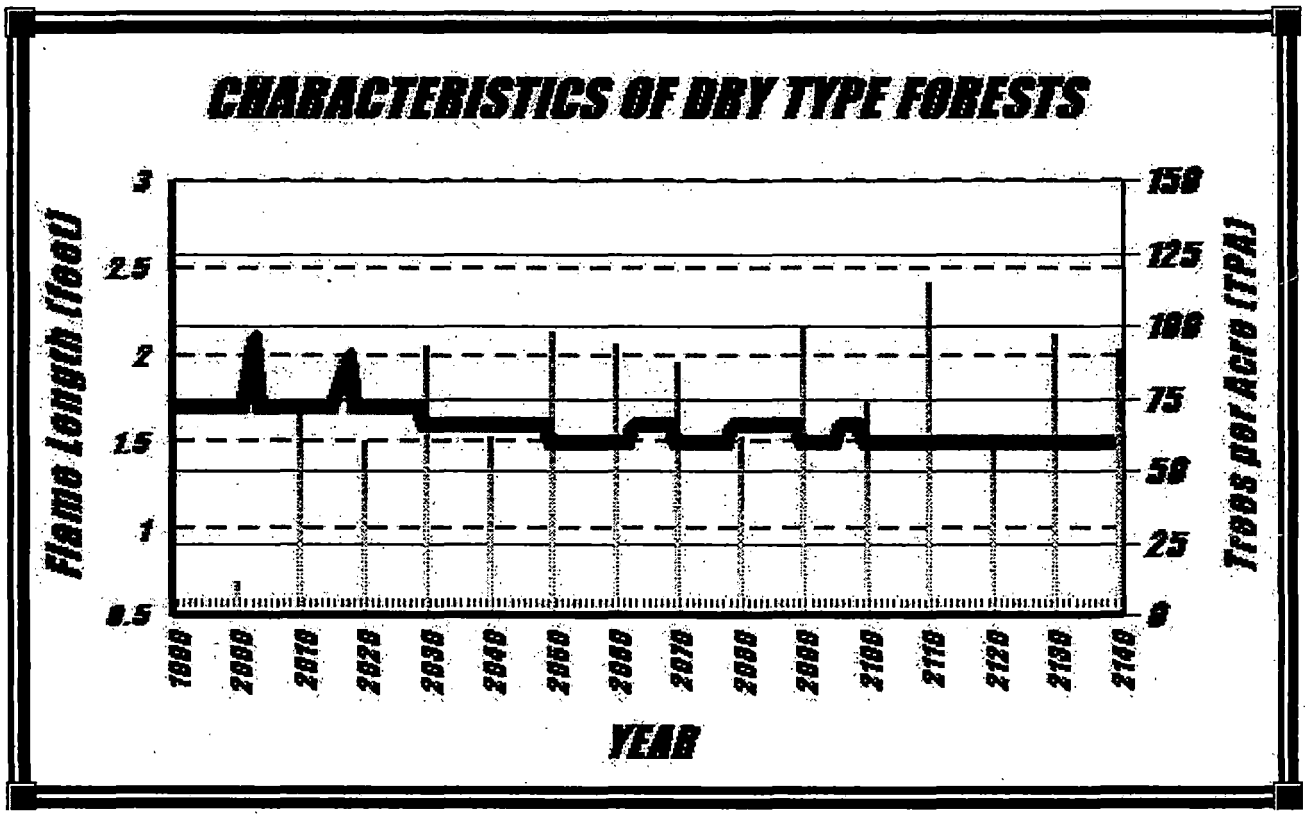
There are several reasons for the departure from historic stand structure now evident in the Coeur d'Alene basin. Timber harvesting began in the 1890's. Ponderosa pine, white pine and cedar were most valuable, larch and Douglas-fir were used for railroad ties and mine timbers. By 1900 a major portion of mature ponderosa pine stands had been harvested and either converted to other uses or were regenerating to dense, often mixed species stands. Prior to 1960 many upland areas were high-grade logged removing only the valuable species, resulting in major stand conversions to grand fir, hemlock, and Douglas-fir. Accounts of early-day logging are presented in greater detail in the "Vegetation" section of this Final EIS.

Since the late 1930's, fire control efforts have become effective. The primary impact of fire control has been to eliminate underburns and mixed severity fires which served as the thinning agents that favored larch and ponderosa pine. These mixed severity fires also generated some large fuels, and did not occur frequently enough to maintain open understories across large landscapes. Overall, in northern Idaho, moist habitat types tended to be a mosaic of forest stand structures and densities, but dense stands were common. In 1909 white pine blister rust was accidentally introduced to western North America. This Eurasian disease devastated white pine forests (Zack, 1995). With the lack of thinning described above, western larch starts a rapid decline by age 80 and ponderosa pine by age 130 (USDA 1994, PNW-GTR-320). These cumulative effects of 100 years of past activities have created large amounts of young stands comprised of tolerant species.

The changes that have occurred to western warm dry forests have been well documented. With effective exclusion of underburning in this century, warm dry forests quickly became overstocked, often exceeding carrying capacity. In the absence of fire, native insects and pathogens regulate stocking by killing susceptible individuals and species. Frequent underburning also prevented excess accumulation of carbon and nutrients in woody biomass. The balance between fire and biological decomposition in regulating carbon accumulations in these forests has been disrupted. A current danger is stand-replacing wildfire with fuel accumulations so high that burns are extremely hot, resulting in critical reductions of stored nutrients, with accompanying loss in potential productivity. The effectiveness of fire prevention and suppression has permitted increased ground fuel accumulations and stratified fuels (both living and dead) to the point where

many fires can not be contained or confined. They now burn hotter and more extensively than even 10 years ago. This affect has been especially evident in dry forests that historically burned frequently (Harvey, 1984). Data collected on the IPNF suggests that the historic fire return interval on the Idaho Panhandle and Colville National Forests is highly variable on dry sites (Zack and Morgan 1994). Data from Priest Lake on small isolated dry sites indicate a fire return interval of approximately 60 years. On the Bonners Ferry Ranger District, fire return intervals were approximately 25 years on Hall Mountain dry sites (please refer to the supporting data in the Project Files, "Fuels/Fire"). The figure below displays modeled simulations of the effects that a 20-year fire return interval could have on a typical old-growth ponderosa pine forest. Values displayed represent potential flame lengths over time should a wildland fire occur, and the number of trees per acre that could occupy the site over time. Predictions were made using the Fire and Fuels Extension-Forest Vegetation Simulator (FFE-FVS) model, described briefly under "Changes Between the Draft and Final EIS," above, and in detail under the Environmental Consequences, methodology section, later in this chapter.

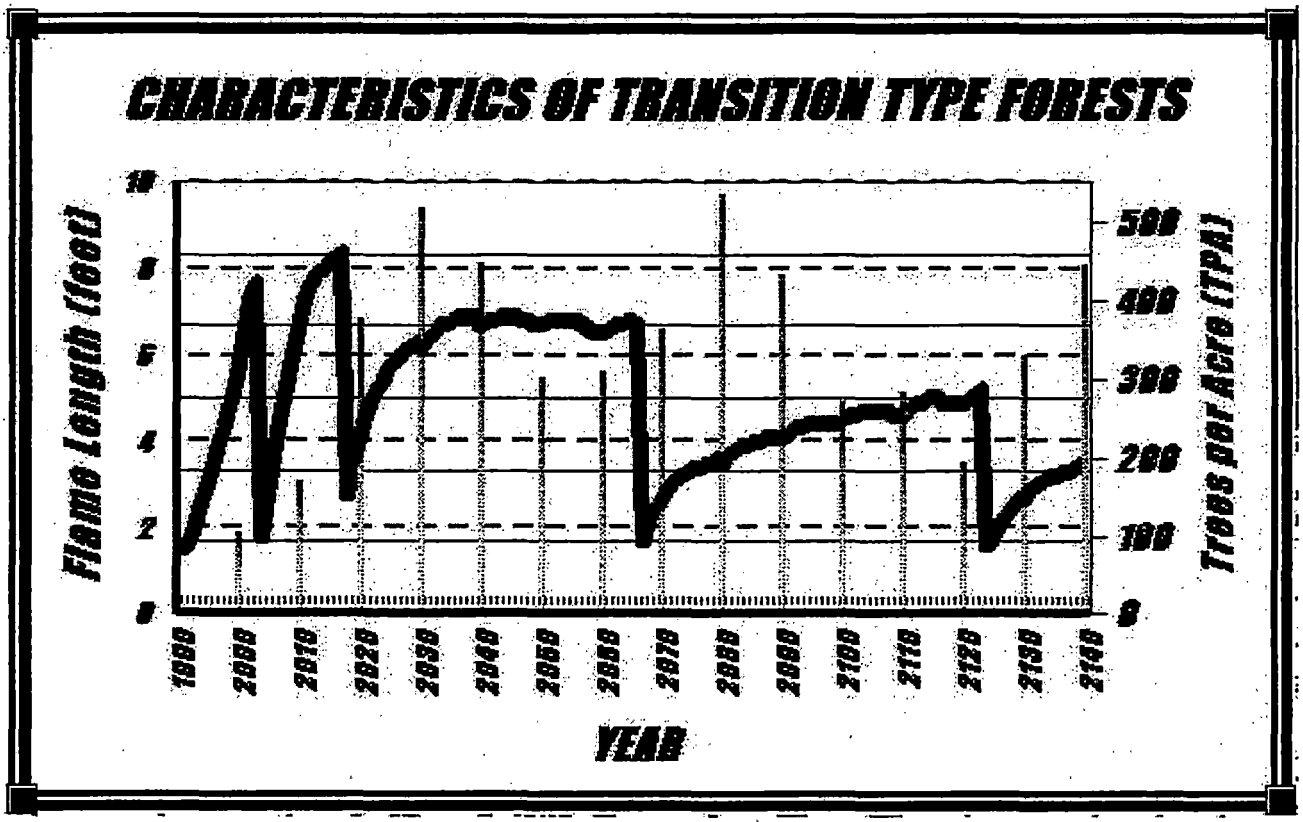
Figure III-3. Estimated trees per acre under a 20-year fire return interval in dry-type forests, and predicted flame length should a wildland fire occur.



In contrast with warm, dry forests, biological decomposition in warm, moist forests is substantial and the role of fire in nutrient cycling is reduced. Conversion of tall, well-spaced white pine forests to low, densely stratified Douglas-fir and true fir forests results in hazardous fuel ladders. Transition forests (warm, dry to warm, moist) possess most of the features of both dry and moist forests. Landscapes were historically a complex patchwork of stands resulting from fires that produced both lethal and nonlethal effects. Due primarily to the influences of fire exclusion and selective logging, as discussed above, modern day transition forests are far more homogeneous than historical forests. Loss of landscape diversity is primarily associated with increasing dominance and layering of shade-tolerant species in stands previously dominated by open-growing ponderosa pine or other seral species. On areas that transition to moist forest types, the historic forest species composition was mixed, with pines and larch playing a more dominant role than that of today.

Mixed severity fires are now an improbable occurrence in many transition forests (Harvey, et.al. 1995, USDA 1999). Data collected on the IPNF suggests that the historic fire return interval on the Idaho Panhandle and Colville National Forests is highly variable (Zack and Morgan 1994). On the Bonners Ferry Ranger District, fire return intervals in transition forests ranged from approximately 23 to 63 years on Hall Mountain and Skin Creek transition sites (please refer to the supporting data in the Project Files, "Fuels/Fire"). The figure below displays modeled simulations of the effects that a 50 to 60-year fire return interval could have on a mixed species forest over a 140-year time period. Values displayed represent potential flame lengths over time should a wildland fire occur, and the number of trees per acre that could occupy the site over time.

Figure III-4. Estimated trees per acre under a 50 to 60-year fire return interval in transition-type forests, and predicted flame length should a wildland fire occur.



Although increases in volume and stocking are not as evident in moist forests as in dry and transition forests, some excessive fuel buildups have developed. Fuel accumulations associated with blister rust mortality can be substantial, and increasing accumulations of dead Douglas-fir and true firs associated with root disease mortality is expected. Additionally, conversion of tall, well spaced white pine to low, densely stratified fir results in hazardous fuel ladders. Thus, significant changes in fire behavior are also a characteristic of modern-day, moist interior forests. Such changes in fire behavior threaten future fire control and place neighboring forest ecosystems at risk (Harvey, 1984).

A significant change from common historic patterns is indicative of unhealthy conditions. Application of this concept to most north temperate and boreal forests characteristic of the western interior of the United States suggests many are unhealthy, especially where historical fire regimes have been significantly interrupted (Harvey,1984, U.S. GAO, 1999a and 1999b). The Government Accounting Office (GAO) report and testimony address the extent and seriousness of problems related to the health of national forests in the interior West, the status of efforts by the Department of Agriculture's Forest Service to address the most serious of these problems, and barriers to successfully addressing these problems and options for overcoming them.

From the landscape perspective, between 1540 and 1931, there was an average of one major fire episode every 19 years, somewhere in the Coeur d'Alene River basin. Since 1931 there has not been any major fire episodes recorded within the basin (Zack and Morgan, 1994). Mapping of the fire history on the Idaho Panhandle National Forests supports this finding also (please refer to the supporting maps and records located in the Project Files, "Fuels/Fire"). Currently, fire occurrence on the Idaho Panhandle National Forests averages 163 fires per year, with a burned acreage average of 665 acres (IPNF annual fire reports; Fire Stat Database). With the exception of the Sundance and Trapper Peak fires in 1967, fires on the Idaho Panhandle since 1931 have not been to the same scale as historic fires.

Most stands within the Coeur d'Alene analysis area are the result of fire occurrence in the 1870's and in 1889. On particular sites where there have been weather and insect-related disturbances, fuel is accumulating. The same types of disturbances under historic conditions would have led to similar fuel accumulations. Historically, that was often a precursor to stand-replacing fires that followed when suitable weather conditions presented themselves (Spurr and Barnes, 1980).

Between 1540 and 1992, the mean fire return interval within the Interior North Fork of the Coeur d'Alene River was 84 years. The mean fire return interval on the Rathdrum Prairie face and the Hayden Lake watershed was 62 years (Zack and Morgan, 1994). Most areas sampled were moist forest types; little data came from dry forest types. The Idaho Panhandle National Forests Draft Wildfire Prevention Plan (1998), evaluated areas of the Idaho Panhandle National Forests as they pertain to wildfire risk. The major components in this evaluation included fire history, fuels, topography and values at risk. For the Coeur d'Alene face and lower Coeur d'Alene River, the results of this evaluation determined the wildfire risk was high as it relates to the annual average number of years; high as it relates to current fuel accumulations; and high as it relates to values at risk. Opportunities to mitigate these risks are available with prescribed fire and mechanical fuels treatment adjacent to private ownership.

ENVIRONMENTAL CONSEQUENCES

Methodology

Of primary concern to fuels management is the long-term fuel loading increase and subsequent changes in fire intensity and severity that may occur as a result of the Douglas-fir beetle outbreak. A team of specialists was convened on the IPNF to assess the Douglas-fir beetle epidemic. The "Outbreak Incident" Assessment team was brought together to assess the magnitude of the outbreak to date, project its future behavior, and develop both short and long-term strategies for treatment. A report documents the Assessment Team's findings and recommendations (USDA,1998c). The purpose of the Fuel Loading analysis conducted for the broadscale assessment was to project the total additional fuel tonnage, on a per acre basis, that could potentially be made available in stands where there is potential for Douglas-fir beetle mortality.

Site-specific analysis done for the Draft EIS followed the same process outlined in the report, but instead was based on the actual observed and predicted extent of mortality to determine the potential increase in fuel loading and the number of snags created per acre (detailed results are located in the Fuels/Fire portion of project file). The total tonnage of fuel that would be removed through harvest was calculated for each alternative, results are documented in the fire/fuels section of the project file. Ten-year old Douglas-fir beetle areas were studied and fuel surveys were completed as a check of assumptions made in the outbreak assessment report. Those findings and the analysis process were documented in a report (USDA,1998a). Based on comments received on the Draft EIS, additional analysis was completed for the Final EIS. For this additional analysis, stands were selected from those used in the fuel accumulation analysis. The analysis was conducted to determine differences in potential fire intensities and severities that could result from different management strategies. A sample of stands was selected that represent the full range of habitat type groups and a full range of predicted fuel load increases within the area due to the Douglas-fir beetle infestation.

The Forest Vegetation Simulator (FVS), widely used by forest managers throughout the United States and Canada to predict the effects of various vegetation management actions on future forest conditions was used for this additional analysis. The Fire and Fuels Extension to FVS (FFE-FVS) integrates FVS with elements from existing models of fire behavior and fire severity. Model output displays fuels, stand structure, snags, and potential fire behavior over time and provides a basis for comparing proposed fuel treatments (USDA, 1998b; USDA 1997c). A full description of the model is contained in the Fuels/Fire portion of project file.

The most recent Douglas-fir beetle outbreak on the Idaho Panhandle National Forests occurred in 1987 and 1988 on the Coeur d'Alene River and St. Joe River Ranger Districts. Three of these sites in the Eagle Creek Drainage on the Coeur d'Alene River Ranger District were studied to determine the fuel loading potential from killed trees and the amount of fuel on the ground and available for wildfire (survey results and documentation are located in the Project Files, "Fuels/Fire").

At these sites, approximately one quarter of the available fuel (from beetle-killed trees) was on the ground. The limbs over one inch were still sound, tree boles were suspended above the ground and still provided sound fuels. Fuels less than one inch were mostly absent due to decay. Regeneration of tolerant species was starting to occur. There were more fine live fuels, grass and low brush, present in the open areas than under the adjacent timber canopies. Sufficient grass was available in some locations to carry a fire. Existing fuel loadings were determined by conducting fuel survey transects in the selected Douglas-fir beetle kill centers. Transects were designed consistent with protocol established by Brown (1974) and Jain (1998). The total estimated potential fuel loading from beetle killed trees at these sites ranged from 72 to 122 tons per acre, the average existing down woody fuel loading varied from 28 to 47 tons per acre.

Vegetation and fuels conditions will change over time as a result of the Douglas-fir beetle infestation. Stand succession in these areas can be predicted based on observations noted above and trends documented in the Outbreak Incident Assessment (USDA, 1998c). Changes in stand structure and forest fuels will go through several stages. Tools are available to measure the effect of these changes on wildfire should one occur. The Forest Vegetation Simulator (FVS) was one tool used for this analysis. Full description of the model, input and output tables for all stands analyzed, and graphs that show the range of outputs for stands analyzed are contained in the Project Files, "Fuels/Fire".

Fire behavior depends on forest density, composition, amount of surface fuel, its arrangement, moisture content, prevailing weather, and physical setting. To characterize surface fire behavior, 13 fire behavior fuel models are available that describe the fuel complex, fuel loading, fuel bed depth, and moisture of extinction (upper limits of fuel moisture beyond which a fire will no longer spread with a uniform burning front) in dead and live fuels for grass, shrub, timber, and logging slash groups. These models in combination with dead and live fuel moisture content, slope angle, and wind speed provide a basis for predicting both fire spread rate and intensity (USDA, 1999a).

Fire spread rates and intensities can be predicted for various fuel types using the BEHAVE model. BEHAVE is an interactive computer system designed to predict or estimate fire behavior characteristics needed for fire management purposes. It is composed of the latest state-of-the-art simulation models developed for fire and associated fuel and environmental parameters. BEHAVE has evolved over several years in conjunction with the material developed for training fire behavior officers at the National Advanced Resource Technology Center in Marana, Arizona. The parameters that the Douglas-fir beetle will affect are the fuel models, as affected timber stands go through successional changes, fuel models that describe how a fire would react within the stand would also change.

Although fire was a significant disturbance on the landscape, its intensity and severity was variable as discussed above. It is important to separate fireline intensity from fire severity. Intensity is the energy release rate per unit length of fireline, and is a physical parameter that can be related to flame length. It can be determined from the product of biomass consumption (energy) and rate of spread of the fire. Fire severity is an ecological parameter that measures, albeit somewhat loosely, the effects of the fire. Two fires of the same

fireline intensity can have quite different effects between an old-growth mixed-conifer forest and a young plantation of similar species because the smaller plantation trees will be more easily scorched and have thinner bark. The fire in the old-growth may be of low severity while the plantation fire is of high severity. Land managers are generally more interested in fire severity, but must approach severity first by estimating fireline intensity and then using models such as FOFEM to predict tree mortality from fireline intensity (Agee, J.K. 1996).

Approximately 5 years following the beetle infestation, Douglas-fir snags would contain sufficient rot in the top third of the tree that would burn off in a few hours (Harvey and Wright, 1967). Federal Wildland Fire Management Policy is to provide for firefighter and public safety as one of the first priorities. The deaths of 34 firefighters in 1994 focused the fire community's attention on wildland fire, and resulted in numerous initiatives at the federal and state levels to improve firefighter safety. One such study was conducted on wildland fire fatalities in the United States between 1990 to 1998 (USDA Forest Service, 1999b) "Falling snags (dead standing trees without leaves or needles in the crowns) killed four wildland firefighters. Although this hazard has resulted in relatively few deaths, and none have occurred in the past four years, the risk of death or injuries from falling snags remains a serious concern. The deterioration of forest health in the western United States has resulted in enormous areas of forested land becoming susceptible to wildfire. Snags typically have much lower fuel moistures than live green trees and burn more readily. In the process, they often throw spot fires far in advance of the main fire, and often burn through more quickly than green trees, falling with little or no warning. The risk of injuries from falling snags increases during the night operational period when visibility is greatly reduced. While the cooler night time period is generally a more effective time to gain control on wildfires, the increased risk from unseen falling snags may limit the widespread use of crews at night in areas of dead and dying timber." Firefighters need to be aware of the dangerous and often life-threatening conditions that falling trees and snags can create during all aspects of firefighting in forested areas. In fact, falling trees and snags are one of the leading causes of death and injury for wildland firefighters (Valdez and Style, 1996).

Where larger fires involve numerous snags per acre, a serious safety hazard exists. In such cases, because of increased safety awareness, it has become common practice for the firefighters to back away from a fire's edge a sufficient distance to allow time to create a safe work environment to construct, burn out, and hold fire lines. This form of fire fighting is often referred to as "indirect attack." Indirect attack often results in more acreage burned and an increased risk of escaped fire.

Direct, Indirect and Cumulative Effects

Direct and Indirect Effects Common to All Alternatives

Once forest canopies are opened, structural changes begin to take place in the surface vegetation. As more sunlight reaches the ground, more grass and brush species can grow and conifer regeneration begins. Fuel models used for estimating fire behavior would also change. Stands reviewed on the Idaho Panhandle National Forests (USDA 1998a) ten years following a Douglas-fir beetle infestation demonstrated the expected surface fuel changes. In adjacent portions of the stands that were unaffected by the Douglas-fir beetle, the stands represented closed canopy timber stands (fuel models 8 and 10). Fire in the portions of these stands affected by the Douglas-fir beetle would now react as a shaded grass fuel model (model 2) or a brush model (model 5 or 6). This condition would last for several years. Rates of spread would increase compared to a model 8 or 10 (please refer to the table below). Since the stands would be more open, atmospheric conditions would have more effect on the fuel, fuels would dry quicker and more wind could penetrate the forest canopy to fan flames.

Trees that are killed by the beetle will stand for several years and therefore will not immediately become available ground fuel that would influence fire activity. By 15 years all branches and large limbs will have fallen, approximately 50 percent of the snags will have fallen also; greater than 90 percent of the snags will

fall within 35 years (USDA, 1998b). The fuel accumulation rate will far exceed the decay rate for several decades. Decay rates for material greater than 3 inches in diameter can be expected to be near 1.5 percent per year; decay rates for limbs in the 1 to 3 inch size class should be near 9 percent per year (USDA 1998b). In affected stands, within 10 to 15 years, fuel conditions will start to resemble a fuel model 10, a timber stand with heavy down material and fuel ladders that enable a surface fire to climb into the crowns or a fuel model 11 or 12, a stand with heavy debris or often referred to as a slash model. Since the stands would still be fairly open and contain more grass and brush or regeneration than a dense timber stand, spread rates may resemble a grass or brush model while intensities may start to resemble that of a fuel model 10, 11, or 12. These conditions are similar to those found by Leiberg (1897) that historically contributed to severe stand-replacing fires in the Coeur d'Alene basin.

Values in the table were predicted using the BEHAVE model and constant weather and fuel moisture conditions to show changes in fire behavior as fuel models change. Two sets of values were used for calculations. The first set represents fuel conditions commonly found during normal summers in the inland Northwest and the second set represents fuel conditions commonly found during drought conditions (NWCG, 1992). The differences between a fuel model 8 and a grass model 2 or brush model 5 or 6 is even more pronounced during drought conditions.

Table III-81. Estimated rate of fire spread and flame length, during normal and drought conditions.

Fuel Model	Rate of spread[1] (chains per hour) normal/drought	Flame length[2] (feet) normal/drought
2	25/32	5.3/6.3
5	11/27	3.4/6.7
6	28/34	5.6/6.4
8	2/2	1.0/1.2
10	7/10	4.5/5.7
11	6/7	3.4/3.7
12	13/15	7.9/9.0

*1 **Rate of spread.** Forward rate of spread of the fire, expressed in chains per hour. One chain equal 66 feet.*
*2 **Flame Length.** The distance measured from the tip of the flame to the middle of the flaming zone at base of the fire, is valuable in determining type of resources necessary to fight fire by direct attack methods. Hand crews can normally suppress fires with flame lengths up to 4 feet, equipment is necessary when flame lengths are between 4 and 8 feet, aerial support is needed for fires with flame lengths up to 11 feet. Direct attack is not effective on fires with flame lengths over 11 feet.*

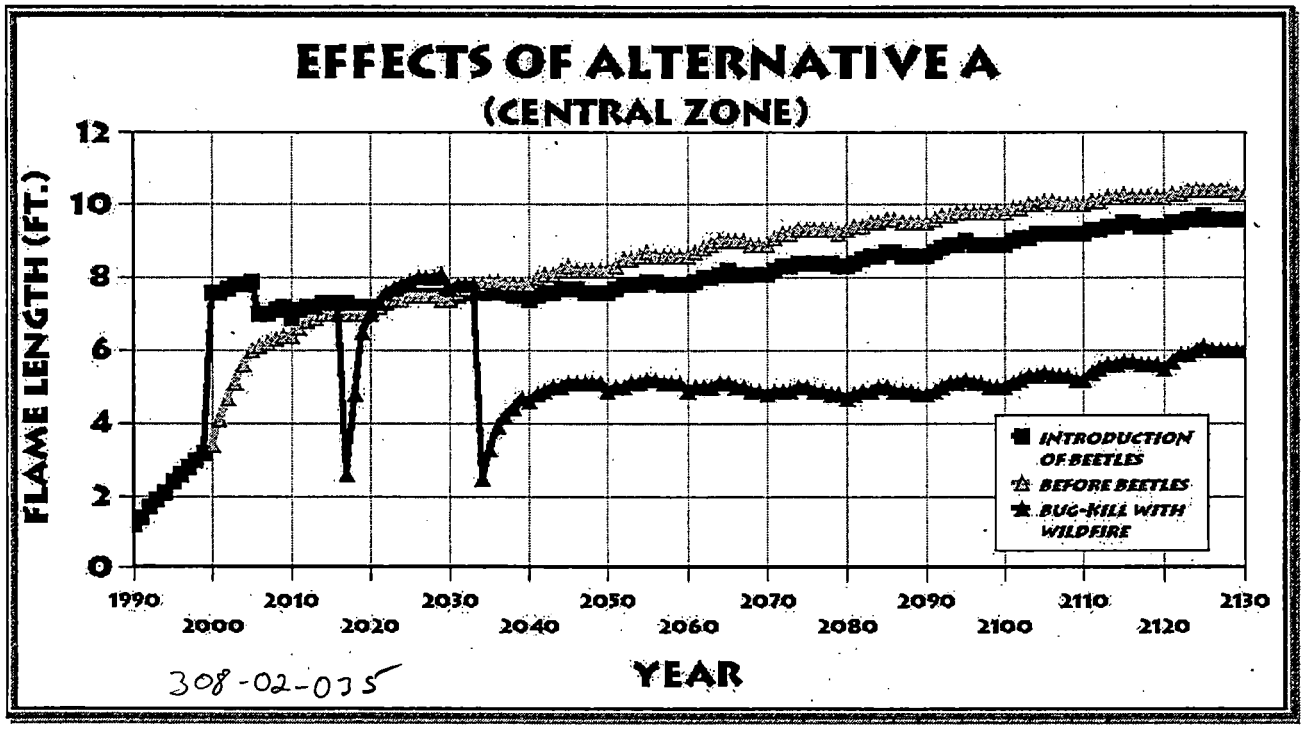
Alternative A (No Action)

Alternative A is the No-Action Alternative, under which there would be no change from current management direction or from the level of management intensity in the area. Timber harvest, reforestation, watershed rehabilitation, and road obliteration activities, in connection with the Douglas-fir beetle infestation, would not
be initiated at this time. The effects analysis reflects existing conditions and the anticipated effects of the Douglas-fir beetle infestations if no actions are taken.

The trends displayed in the figure below represent effects of a natural process of fuel accumulation and change in stand structure over time. Similar changes in ecosystem structure in the past have undoubtedly contributed to the fires, from lethal stand-replacing to low severity underburns, that recycled inland ecosystems. However, prolonged buildup of fuel may eventually lead to fires more catastrophic and destructive to the site than typically occurred in the native forest. Where the disturbance regime was repeated, the historic fuel loading and potential flame length pattern for ecosystem fires would have been erratic, similar to the line shown in the figure below for a series of wildfires that could burn in fuel conditions created by Douglas-fir beetle. The graph should not be interpreted as displaying a prediction as to when such a disturbance might occur but rather a representation of changes such an event could cause on stand

characteristics that influence fire intensity and severity. After fire occurrence, the fuel loading and potential flame lengths would be reduced while fuel accumulated from trees killed by the fire. After several years of fuel accumulation, the potential would rapidly increase, which would explain the repeat burns historically common to inland forests (Leiberg, 1897; Zack and Morgan 1994). Following these reburns the potential intensities would be lower for several years as forests became reestablished. This same process controls stand density levels and species composition.

Figure III-5. Predicted effects of a natural process of fuel accumulation and change prior to the beetle infestation (No-Action Alternative), effects of fuel conditions created by the beetle infestation, and effects of beetle-related fuel accumulation and wildfire.



The figure above displays the results of the FFE-FVS model outputs for one stand on the Coeur d'Alene District. These results are typical for stands modeled and represent a mid range effect (Reinhardt, 1999). As depicted, fuel loadings and flame lengths of a wildfire would be expected to increase over time as a forested stand matures and surface fuels accumulate faster than the decay rate. Because of the bark beetle induced changes in stand structure, these changes would occur at an accelerated rate. The immediate effect would be for increased wind penetration into forested stands, which in the event of a fire start, would increase flame lengths and rates of spread. In successive years, the model depicts the effects of surface fuel loading changes as portions of limbs and tops from the beetle killed trees fall to the ground. As the dead fuel accumulation from the beetle killed trees slows, increases in regeneration provide fine fuels necessary to maintain flame lengths and spread rates. Intuitively, fire professionals know that heavy fuels increase flaming and smoldering time periods, thus increasing severity, even though the existing generation of fire behavior models do not account for this characteristic (Reinhardt, pers. comm, 1999).

The effects of the No-Action Alternative are presented in a range. The Regional Entomologists have predicted that the Douglas-fir beetle epidemic will continue for 2 to 4 years, killing additional timber in stands that exhibit characteristics preferred by the beetle. The table below represents the effects of the current infestation levels, and the effects of the projected extent of the epidemic. The actual acreage may be more or less than the projected level, there are too many factors that could influence the extent of the

infestation to predict exactly how far the beetle will go. The values for fuel accumulation risk equate to the tons per acre of beetle killed trees that will be available to fall and become surface fuel for a ground fire, these values are in addition to existing fuel loadings.

Table III-82. Fuel accumulation risk under Alternative A, Coeur d'Alene River Ranger District

Fuel Accumulation Risk	Current Acres Untreated	Projected Acres Untreated	Treated Acres
Less than 40 tons/acre	13,202	22,583	0
Greater than 40 tons/acre	1,798	4,117	0

Table III-83. Fuel treatment under Alternative A, Coeur d'Alene River Ranger District

Fuel Treatment	Prescribed Fire	Pile and Burn	Yard Tops	Lop & Scatter Tops
Acres	0	0	0	0

As discussed previously under the Characterization and Existing Conditions section, maintaining seral species is an important step in sustaining forested environments that can adapt and sustain disturbances within the range of natural variability. Changes to structural stage and species composition are discussed in the Vegetation section of this FEIS.

Cumulative Effects Common to All Alternatives

The effects of the Douglas-fir beetle on infested forested areas will be an acceleration of successional changes that the areas are currently going through. The projected infestation on the Coeur d'Alene District is confined to approximately 26,700 acres within a Ranger District of 726,990 acres. As a percentage, this is rather insignificant and would not in itself lead to catastrophic large stand-replacing wildfires. As stated earlier, most large stand-replacing fires on the Idaho Panhandle and Colville National Forests are wind driven or the result of regional climactic patterns, higher fuel loadings from beetle killed trees would have minimal affect on such an event. Of significance is the fact that this alternative is a continuation of trending forested ecosystems further outside their range of historic species composition, see Chapter III, vegetation section.

Direct and Indirect Effects Common to All Action Alternatives

The Douglas-fir beetle outbreak in the analysis area presents long-term fire and fuels consequences. Significant accumulations of additional fuel and increased mortality result in an increase in snag density. With the beetle induced thinning in the overstory, regeneration of species tolerant to insects and disease will begin to occur. This provides the fine fuels necessary for a fast moving fire and the heavy down fuel loadings, contributing to higher than normal fire intensities. These conditions could persist for several decades; combined they present serious safety hazards to firefighters when suppressing fires in affected stands.

It is not possible or desirable to "fireproof" fire dependant ecosystems, but the potential of severe fire can be reduced by proactive land management. Federal land management agencies can mimic natural disturbances, but it is essential for managers to consider that current conditions may be considerably different than those conditions that occurred historically. Reintroduction of native processes such as fire without modification of structural patterns, fuel loadings, and spatial distributions can produce unpredictable and undesirable effects (USDA, USDI, 1996). Multiple treatments will be needed to regulate vegetation structure, composition, and associated biomass loadings. Long management horizons may be required to restore unhealthy ecosystems to more sustainable conditions. The most effective means to restore long--term forest health will be density and

fuels management, plus regulation of species composition to improve the dominance and distribution of seral species (Harvey, et.al. 1995, USDA 1999a). The use of prescribed fire alone for stand restoration would be largely ineffective (with spring burns), or downright harmful and wasteful (dry season burns) (Barrett, S. W. 1994). In the case of the Idaho Panhandle and Colville National Forests, the lack of an adequate seral species seed source would assure long term failure of vegetative restoration efforts without artificial regeneration of seral species.

Timber harvest would significantly affect both short and long-term fuel loading. Timber harvest converts unavailable aerial fuels into available surface fuels. Thus the risk of crown fire may be reduced while the risk of surface fire can be increased by adding fuel to the ground. An increased fire hazard and risk of ignition from timber harvest may result. Treatment of created fuels can reduce these risks.

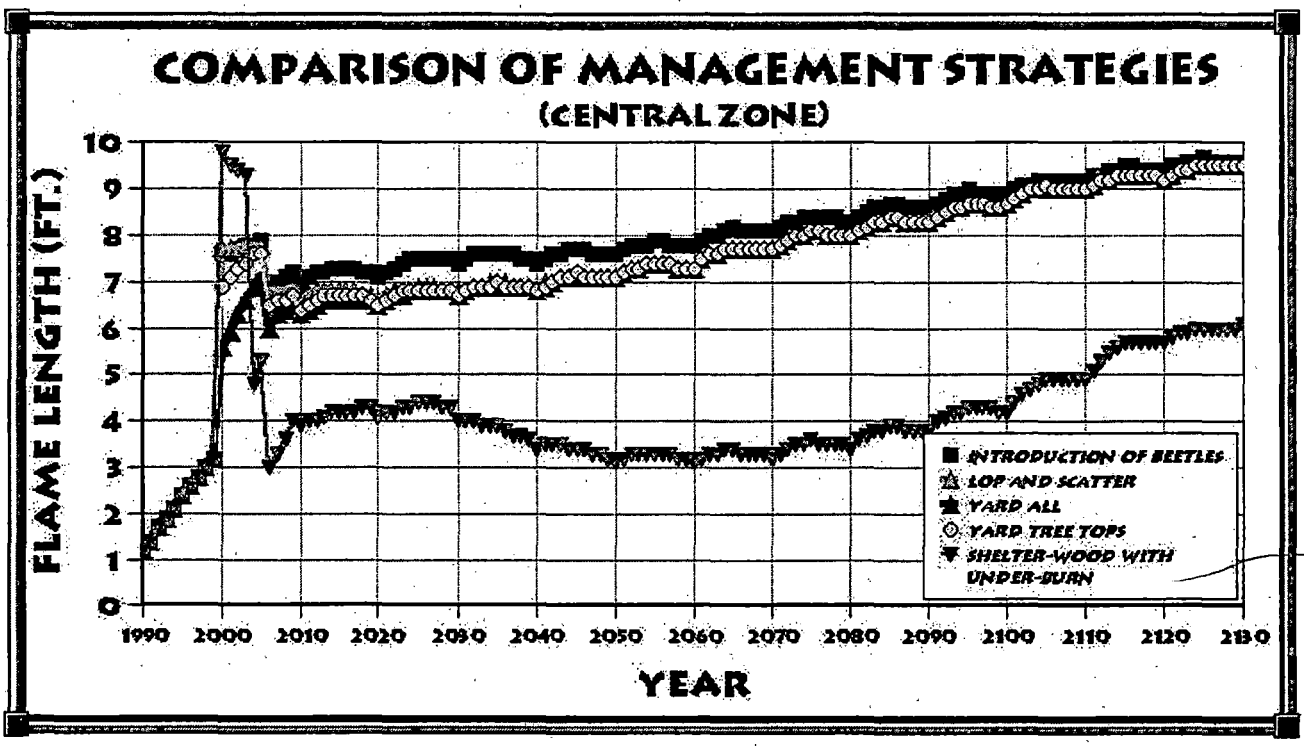
The potential for a fire outside of proposed harvest areas, the overall fuel mosaic on the landscape, and future vegetation and fuel succession must be considered when planning fuels treatments. Natural stands and particularly partial-cut stands that are not treated for fuels reduction, could experience greater fuel buildup over time than treated managed stands. Treating risk areas where harvest takes place in this timber sale entry provides an opportunity to reduce fuel loading and continuity with stands and over the entire analysis area.

Effects Common to Alternatives B, C, D, E and F

Any type of human activity increases the possibility of ignition and wildfire. Common ignition sources include; equipment operation, smoking and arson. The timber purchaser will be required to have fire equipment and to take necessary fire precautions to prevent a wildfire from occurring. In the event of extreme fire conditions, the harvest activities would be regulated or suspended until conditions improve. The timber sale administrator closely monitors the fire prevention requirements of the timber contract throughout the timber harvest operations. While these alternatives would treat some areas where fuel accumulation and presence of snags would be a concern, they do not treat all stands, especially if the beetle infestation continues as predicted by entomologists. The preferred fuels treatment for all units that contain fire resistant species is underburning. In other units, slash would be piled and burned where slopes permit. Alternatives F and D incorporate additional fuel treatment adjacent to private lands.

The figure below displays the results of the FFE-FVS model outputs for one stand on the Coeur d'Alene District. These results are typical for stands modeled and represent a mid-range effect (Reinhardt, 1999). As depicted, fuel loadings and flame lengths of a wildfire would be expected to increase over time as a forested stand matures and surface fuels accumulate faster than the decay rate. Because of the Douglas-fir beetle induced changes in stand structure, these changes would occur at an accelerated rate. The immediate effect would be for increased wind penetration into forested stands, which in the event of a fire start, would increase flame lengths and rates of spread. In successive years, the model depicts the effects of surface fuel loading changes as portions of limbs and tops from the beetle killed trees fall to the ground. As the dead fuel accumulation from the beetle killed trees slows, increases in regeneration provide fine fuels necessary to maintain flame lengths and spread rates. Heavy fuels increase the open flame and smoldering time periods, increasing severity.

Figure III-6. Comparison of effects of management strategies for treatment of fuel accumulations.



Three different management scenarios were modeled. These scenarios include salvage logging with two different slash treatment prescriptions, yarding of tops and lopping tops. The third scenario was a regeneration harvest system, shelterwood with reserves, followed with broadcast burning. As displayed in the figure above, salvage logging would increase potential flame lengths over the short term. This is because when these trees are harvested, all fuel would be on the ground instead of accumulating more slowly, as under the No-Action Alternative. Yarding tops would reduce fuel loadings and potential flame lengths somewhat but would not eliminate the increases seen with other options because of breakage and increased solar and wind penetration into the stand. It was estimated that yarding tops would only remove 50 percent of the tops of harvested trees, dead Douglas-fir would be more brittle than green trees so breakage of tops and limbs would be significant. Removal of all logging slash would not totally eliminate the potential for increased flame length should a fire occur because the extent of mortality would provide more open stand characteristics allowing increased wind and solar penetration. Regeneration harvesting, followed with underburning appear to be the best treatment to reduce fuel loads and reestablish seral species.

As discussed previously, under the Characterization and Existing Conditions section, maintaining seral species is an important step in sustaining forested environments that can adapt and sustain disturbances within the range of natural variability. Effects of these action alternatives on changes to structural stage and species composition are discussed in the Vegetation section of this Final EIS.

The values for fuel accumulation risk, displayed in the table below, equate to the tons per acre of Douglas-fir beetle killed trees that will be available to fall and become surface fuel for potential ground fires. These values are in addition to existing fuel loadings and equal untreated acreage after implementation of any of the action alternatives.

Table III-84. Fuel accumulation risk for Alternatives B, C, D, E, F on the Coeur d'Alene River Ranger District

Alternative	Less than 40 tons/acre		Greater than 40 tons/acre	
	Untreated Acres	Treated Acres	Untreated Acres	Treated Acres
Alternative B	13,579	9,004	2,890	1,227
Alternative C	13,579	9,004	2,890	1,227
Alternative D	11,876	10,707	2,601	1,516
Alternative E	13,579	9,004	2,890	1,227
Alternative F	13,920	8,664	3,116	1,000

Table III-85. Fuel treatment (acres) under Alternatives B, C, D, E, F on the Coeur d'Alene River Ranger District

Fuel treatment	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
Harvest treatments	10,231	10,231	12,223	10,231	8,036
Prescribed fire	867	867	1,829	373	* 7,034
Pile and burn	89	89	89	0	187
Yard tops	9,275	9,275	3,420	9,858	2,441
Lop and scatter	0	0	6,849	0	0
Fuel break	0	0	19	0	108
Hand pile	0	0	15	0	5

* *Includes wildlife ecosystem burning.*

Alternative G

Alternative G was developed to treat fuel accumulations without the use of timber harvest. Stands were selected for prescribed fire treatment based on the ability of fire managers to meet vegetation management objectives with prescribed fire. This alternative proposes 1,115 acres of prescribed fire. This alternative would treat a very small portion of areas where fuel accumulation and presence of snags would be a concern, it did not treat a majority of the stands.

The figure below displays the results of the FFE-FVS model outputs for one stand on the Coeur d'Alene District. The stand was a second growth ponderosa pine stand with heavy Douglas-fir ingrowth. With Douglas-fir beetle mortality in larger Douglas-fir, slashing and pruning of understory trees and prescribed fire, fuel loadings and flame lengths of a wildfire would be expected to over time decrease to patterns historically associated with similar forest types. Sites modeled were dry Douglas-fir and grand fir sites, and prescribed fire was applied at approximately a 20-year interval.

Figure III-7. Predicted effects of fuel conditions created by the beetle infestation, and effects of prescribed fire under Alternative G.

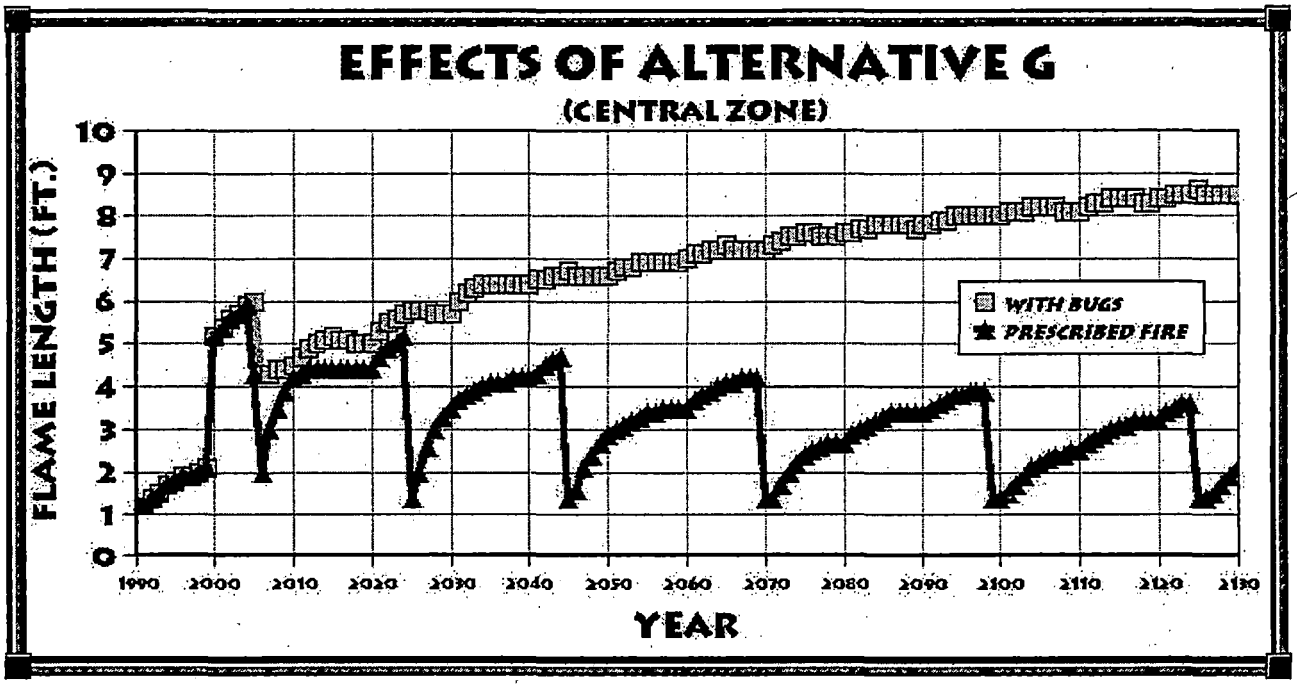


Table III-86. Fuel accumulation risk under Alternative G on the Coeur d'Alene River Ranger District.

Fuel Accumulation Risk	Untreated Acres	Treated Acres
Less than 40 tons/acre	21,477	1106
Greater than 40 tons/acre	4,108	9

Table III-87. Fuel treatment (acres) for Alternative G on the Coeur d'Alene River Ranger District

Fuel treatment	Acres
Harvest treatment	0
Prescribed fire	* 1,115
Pile and burn	0
Yard tops	0
Lop and scatter tops	0
Fuel break	0
Hand pile	0

** Includes wildlife ecosystem burning.*

Cumulative Effects at the Coeur d'Alene River Ranger District Scale

Cumulative Effects Common to All Action Alternatives

As stated earlier, most large stand-replacing fires on the Idaho Panhandle and Colville National Forests are wind driven or the result of regional climactic patterns, salvaging beetle killed trees would have minimal affect on such an event (USDA 1999a). The scattered nature of regeneration units with underburning also would have minimal affect on such an event. This alternative does contribute to restoration of historic species composition, albeit in a small and scattered nature, see Chapter III, vegetation section.

Cumulative Effects on Private Lands

The amount of private land ownership within each analysis area was addressed in the previous vegetation section. The effects of Douglas-fir beetle mortality on other ownerships within the project area would be difficult to ascertain due to a lack of detailed information on current conditions and on how private land owners will treat beetle killed trees. In very general terms, non-industrial forest owners and industrial forest owners are likely to aggressively harvest dead and dying trees because of their commercial value. Owners of small home sites and recreational property are less likely to harvest their timber. Private landowners that do harvest trees are less likely to invest money in reforestation, so most regeneration will be from natural seeding.

Most information on vegetation and fuel conditions and planned treatments have been obtained from aerial photos, satellite imagery and personal knowledge. Some information on past and planned harvest and road building has been gathered from industrial owners and on state lands, but generally no specific information is available for non-industrial private landowners. The information that is known has been included in Appendix E.

In general, most private lands are on lower elevations and receive less moisture and are comprised of a higher percentage of dry sites than National Forest lands. There are industrial timberlands in some of the higher elevations. Some past harvests have been regeneration harvests that have created some openings in the forest canopy and have resulted in regeneration of seral species. But many existing openings, particularly in the lowlands, are a result of land clearing for homes and pastures. Other private lands are natural openings or meadow lands acquired through homesteading or other means.

More often, timber harvests on private lands tend to be partial cuts that remove trees of the highest economic value (usually the largest) and typically removes large fire resistant seral species. Natural regeneration is relied on to fill most created openings. This tends to favor shade tolerant Douglas-fir and grand fir over early seral species such as pine and larch. As previously discussed, the historic fire adapted vegetation structure was lost early in the century. With increased rural/urban development, it is probably safe to say that inherent disturbance regimes and historic vegetation patterns will never be reestablished on a landscape scale. This pattern of vegetation change has led to increased fire intensities and severities and is expected to continue. Private lands are expected to be managed similar to the past.

Since private lands often include residences and other developments, fire will continue to be aggressively suppressed, although the potential for increased ignitions continues to rise as human use increases. Land management agencies in Northern Idaho and Eastern Washington are not advocating a return to historic disturbance regimes at the landscape level. Natural disturbance regimes included severe and rapidly moving forest fires that sometimes exceeded 100,000 acres. Over 500,000 people now live in an area that historically was inhabited by 5,000 - 10,000 Native American people. While the full range of historic fire regimes was a functional part of the historical natural ecosystem, we are now operating in an environment of a changed human context. Returning to the full range of historic disturbance patterns would generate significant threats to human life and property. Even smaller threats (i.e. Fire Storm 91) have not been acceptable to the public.

Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions are listed in Appendix E. These future actions are not individually or cumulatively of a scale similar to historic disturbance patterns. Disturbances similar to historic proportions would be necessary to facilitate the vegetation restoration that is needed to change trends in potential fire intensities and severities. Foreseeable future actions would result in vegetation restoration at the stand scale.

Effects of Opportunities

Timber Stand Improvement (Precommercial Thinning and Pruning) - Stands identified as future thinning needs are identified in the project file. Thinning redistributes growth and adjusts species composition for the future. Thinning would favor healthy trees of desired species adapted to the various habitat types. The seral species of ponderosa pine, western larch, and white pine would be favored when present on the appropriate growing sites. The effects of this action in the long run will be to move stands towards historic species composition and make them more resilient to disturbances such as wildfire. In the short run, increases in dead fine fuels would increase wildfire intensity should one occur.

Watershed and Wildlife Restoration - Restoration opportunities that may be accomplished are predominately road obliteration. The ignition density analysis for the Idaho Panhandle and the Newport District portion of the analysis area shows that most of the highest ignition densities are in developed areas. Decreasing the road density may result in a small decrease in human caused wildland fires, although the change may not be noticeable because there would not be a significant change in road densities or use patterns on the travel zones that have the highest ignition density.

Noxious Weed Treatment and Monitoring - Noxious weed treatment and monitoring would have no effect on wildland fire intensities in forest fuel types. If spotted knapweed were to invade and dominate surface vegetation in dry open forest types and meadow types, a reduction of fire intensity could be expected. Spotted knapweed out competes native grasses and does not burn well. In areas where knapweed infestations are reduced in these types, fire intensities could be expected to increase in the event of wildland fire.

Ecosystem Burning - Stands where the opportunity exists for ecosystem burning were included and analyzed in Alternatives D, F and G. The objective of most of these burns is big game habitat improvement. Some of the stands are dry site stands and others are brushfields. Effects of treating these stands would be similar to those discussed under Alternative F.

Consistency With the Forest Plan

The goal of the Forest Plan is to provide efficient fire protection and fire use to help accomplish land management objectives. Alternative A excludes fuels treatment, Alternative G treats a minor portion of the infested acreage there would be little difference between it and the No-Action Alternative. The continued succession of fuels and vegetation, mortality from insect disease, and the exclusion of fire will create areas where the trend in fire behavior characteristics will in time exceed the goals, objectives and standards established in the Forest Plan.

Action alternatives propose prescribed burning and makes progress towards reducing the potential intensities of wildfire in areas affected by the Douglas-fir beetle. Even with this treatment, untreated areas and areas treated with salvage harvest will continue to trend toward characteristics that exceed the goals, objectives and standards established in the Forest Plan.

AIR QUALITY

CHANGES BETWEEN THE DRAFT AND FINAL EIS

In response to comments and in recognition of errors in the Draft EIS, the Final EIS has changes in the Air Quality section. Minor changes have taken place in the analysis numbers in most alternatives. Many wording and other editing changes have taken place to further clarify the descriptions of information provided. Results of FOFEM emissions modeling are displayed in tabular format and included in the Draft EIS.

REGULATORY FRAMEWORK

Current direction to protect and improve air quality on National Forests is provided by 1) the Forest and Rangeland Renewable Resources Act of 1974 (16 U.S.C. 1601), as amended by the National Forest Management Act (16 U.S.C. 1602); 2) the Federal Land Management Policy Act of 1976 (43 U.S.C. 1701); and 3) the Clean Air Act amendments of 1977 and 1990 (42 U.S.C. 7401-7626). The Clean Air Act (Section 110) requires states to develop State Implementation Plans (SIPS) which identifies how the State will attain and maintain national air quality standards.

The Clean Air Act amendments of 1977 set up a process which included designation of Class I, II, and III areas for air quality management.

> ***Class I:*** *These areas include all international and national parks, greater than 6,000 acres, and national wildernesses greater than 5,000 acres which existed on August 7, 1977. This class provides the most protection to pristine lands by severely limiting the amount of additional man-made air pollution which can be added to these areas. The nearest federally designated Class 1 area is the Cabinet Wilderness, located approximately 65 air miles east on the Idaho-Montana border. The potential of smoke intrusion into this class I area from prescription burning operations is considered low. The majority of prescription burning is implemented in the spring when smoke dissipates rapidly during good to excellent dispersion days.*
>
> ***Class II:*** *These areas include all other areas of the country. These areas may be upgraded to Class I. A greater amount of additional man-made air pollution may be added to these areas. All Forest Service lands which are not designated as Class I are Class II lands. The land within the Decision Area is designated as Class II.*
>
> ***Class III:*** *These areas have the least amount of regulatory protection from additional air pollution. To date, no Class III areas have been designated anywhere in the country.*

The Clean Air Act of 1977 (as revised 1991), requires the Environmental Protection Agency (EPA) to identify pollutants that have adverse effects on public health and welfare and to establish air quality standards for each pollutant. Each state is also required to develop an implementation plan to maintain air quality. The EPA has issued National Ambient Air Quality Standards (NAAQS) for sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, lead, and particulate matter less than or equal to 10 microns (PM 10). Idaho, Washington and Montana also have standards for these pollutants. Particulate standards were originally defined in terms of Total Suspended Particulate (TSP). Recently, the Environmental Protection Agency (EPA) has changed the particulate standard to apply to smaller particulates PM 2.5. This change was made because PM10 is too small to be effectively filtered by the human respiratory system and much of it penetrates deep into the lungs. When inhaled, these small particulates can cause respiratory problems, especially in smoke sensitive portions of the population such as the young, elderly or those predisposed to respiratory ailments. The Act defines NAAQS as levels of pollutants above which detrimental effects on human health and welfare could occur. An area that is found to be in violation of NAAQS is called a non-attainment area. Pollution sources in these areas are subject to tighter restrictions. Spokane, Libby, Sandpoint and Pinehurst are federally designated non-

attainment areas, because of an excess of PM10. Smoke from the project area will not likely affect any of these areas because of distance and prevailing winds.

Airshed Groups are assembled in North Idaho and Montana to work cooperatively to "minimize or prevent" accumulation of smoke in Idaho and Montana to such degree as necessary to meet State and Federal ambient air quality standards when prescribed burning is necessary for the conduction of accepted forest practices, i.e.hazard reduction, regeneration site preparation and wildlife improvement (MOA, 1990). The U.S. Forest Service, Coeur d'Alene River Ranger District, is a member of this group and adheres to the group's restriction procedures. As monitoring units, the airshed groups may reduce burning, stop burning in specific areas, or cease burning entirely when meteorological or existing air quality conditions so warrant. Forest management burning is thereby regulated during the months of September through November (North Idaho Cooperative Smoke Management Plan).

AFFECTED ENVIRONMENT

Air quality within the analysis area is good to excellent throughout the majority of the year. Season deterioration of air quality is occasional with smoke and dust accumulations. Smoke is generated from prescribed burning, wood burning stoves and agricultural field burning. Dust primarily results from vehicle traffic on gravel and native-surface roads or wind erosion on agricultural lands within local counties and as far away as the Palouse and Columbia Basin regions of Idaho and Washington. Existing air quality has been determined by visual observations and annual reports from the North Idaho Smoke Management Committee which includes air quality monitoring data compiled by the Idaho Department of Environmental Quality (DEQ).

Historically, fire, and therefore smoke, have always been part of the Northern Rockies ecosystem. Fire history would indicate impacts by smoke on an infrequent basis. Fires occurring naturally in the assessment area and the general weather regimes of North Idaho indicate emissions persisting from a few hours to several days. These impacts would have occurred in the summer and early fall months.

The effect of Euro-American settlement and subsequent fire protection has reduced the amount of area burned, under some firefighting conditions, and reduced the duration of smoke emissions from wildland fires. In the case of prescribed fire, the amount of smoke generated has been mitigated from earlier levels of post settlement burning by forest managers scheduling burns for periods during good to excellent dispersion.

The Clean Air Act (1967 and amendments to the Act 1972, 1977, 1990) provide direction to protect and enhance the quality of the Nation's air resources and to protect public health and welfare. The Act provided the States primary responsibility for air quality management. The North Idaho Airshed Group and the Montana State Airshed Group regulate forest management burning in accordance with the State Implementation Plans (SIP). The analysis area is contained entirely within Airshed 11 as identified by the North Idaho Airshed Group.

ENVIRONMENTAL CONSEQUENCES

Methodology

The primary method used to determine the estimated effects on air quality for the action alternatives is described as follows:

> *Emission production modeling was completed for each alternative using the First Order Fire Effects Model (FOFEM) (see project file). This model is a software program designed for resource managers to estimate woody fuel consumption and smoke production for forest stands (USDA 1997d). FOFEM models emission production, not visibility or dispersion. Categories of emissions estimated are PM 2.5 (particulate matter less than 2.5 microns in diameter), and PM10 (particulate matter less than 10 microns in diameter)*

Disposal of slash from harvesting through the use of prescribed fire can temporarily affect air quality. Slash and heavy fuel loading also increases potential wildland fire intensities and severity. Prescribed fire is often used as a tool to reduce fuel loadings thereby reducing potential intensities and severity.

The Idaho Panhandle National Forest is a party to the North Idaho Smoke Management Memorandum of Agreement, which established procedures regulating the amount of smoke produced from prescribed fire. The North Idaho group currently uses the services and procedures of the Montana State Airshed Group. The procedures used by the Montana Group are considered to be the best available control technology (BACT) by the Montana Air Quality Bureau for major open burning in Montana. A Missoula-based monitoring unit is responsible for coordinating prescribed burning in North Idaho during the months of September, October, and November. This unit monitors meteorological data, air quality data, and planned prescribed burning and decides daily on whether or not restrictions on burning are necessary the following day.

In practice, a list of all prescribed burning planned for the fall burning season on the Coeur d'Alene River Ranger District is forwarded to the monitoring unit through the Idaho Panhandle National Forest fire desk before September 1. Daily, by 8:30 a.m., the Coeur d'Alene River Ranger District informs the fire desk of all burning planned for the next day and the fire desk forwards this information to the monitoring unit. By 3:00 p.m. the same day the monitoring unit informs the Forest if any restrictions are to be in effect the following day, and the fire desk informs the District. These procedures limit smoke accumulations to legal, acceptable limits.

This practice has also been proposed to monitor spring burning in the year 2000. However, it is anticipated that prescribed burning associated with this project will not occur before the fall of 2000.

Historically, prescribed burning on the Coeur d'Alene River Ranger District occurs in the spring and fall seasons over a time span of 45 to 60 days during each season. All burning complies with federal, state and local regulations. Management practices include, but are not limited to, burning under spring like conditions (high fuel, soil and duff moistures) to reduce emissions and provide for retention of large woody debris. Prescribed burning during spring or fall will generate less smoke than a much hotter stand replacing summertime wildfire.

Direct, Indirect and Cumulative Effects

Alternative A (No Action)

Direct and Indirect Effects

Alternative A is the No Action alternative, under which there would be no change from current management direction or from the level of management intensity in the area. Timber harvest, reforestation, watershed rehabilitation, road obliteration activities, and fuels treatment in connection with the Douglas-fir beetle infestation, would not be initiated at this time. This alternative would have no immediate adverse effect on air quality. Current management activities in this area contribute little additional pollutants to the local airsheds. The primary source of pollution would be from vehicular exhaust and dust from motor traffic in the area.

Cumulative Effects

The potential for air quality degradation and reduced visibility may increase with this alternative. Existing and increased mortality in the Analysis Area contributes to increased intensities and severities if a wildland fire were to occur. Consumption of increased fuel loads and understory biomass would increase the amount of smoke emissions. These emissions may remain in the local and surrounding airsheds for a period of a few days to several weeks depending on the fire's size and intensity.

Effects Common to All Action Alternatives

Direct and Indirect Effects

All action alternatives include underburning for fuels reduction, seed bed preparation, and nutrient recycling purposes. For Alternatives B through F, additional burning would also be implemented to dispose of landing, machine and handpiles. Dust that escapes the local area and mixes with the general atmosphere generated from road construction, reconstruction, and increased vehicle traffic may temporarily affect air quality. The contract will require dust abatement during dry periods when dust from road travel becomes a problem.

Results of the FOFEM emissions modeling determined annual PM 2.5 and PM 10 standards would not be exceeded for each alternative. These results are based on completing approximately 20% of burning annually by alternative.

Table III-88. Summary of fuels treatment acres, Coeur d'Alene River Ranger District.

Treatment	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Underburn	0	867	867	1,717	373	5,406	304
Wildlife/Eco Burns	0	0	0	**1,628	0	1,628	811
Jackpot Burn	0	0	0	112	0	0	0
Burn Landings	0	1,000	1,000	810	1,030	510	0
Lop and Scatter	0	0	0	6849	0	0	0
Top Attached Yard	0	9,275	9,275	3,420	9,858	2,441	0
Machine Pile & Burn	0	89	89	89	0	187	0
Handpile & Burn	0	0	0	15	0	5	0
Handpile FB	0	0	0	17	0	29	0
Ridgetop FB	0	0	0	0	0	77	0
Trampling FB	0	0	0	2	0	2	0
Total Harvest Acres	0	10,231	10,231	12,223	10,231	8,036	0
Total Treatment Acres*	0	11,231	11,231	14,681	11,261	10,285	1,115
Emissions from burning							
Total tons of PM10	0	443	443	661	386	754	99
Total tons PM2.5	0	375	375	559	327	637	83

** The number of total treatment acres exceeds harvested acres by the burn landings acres.*
*** Identified as an opportunity if funding becomes available.*

Fuels treatments for all action alternatives, are scheduled to be completed within five years after harvest operations.

Fuel Treatment Methods

Numerous methods of prescription fire would be implemented to treat activity created and natural fuels:

Underburning: This is a method designed to meet various resource objectives where a tree canopy is present and is to be preserved. The treatment reduces woody debris, provides site preparation for natural or artificially planted regeneration and eliminates unwanted vegetation. Underburning can also improve wildlife habitat.

Ecosystem/Wildlife Burning: This is the application of prescribed fire to fire dependent ecosystems to meet multi-resource objectives. One example would be to improve forage habitat for wildlife

Jackpot burning: This is a modified method of broadcast burning used primarily to burn concentrations of fuel, where the fuelbed is not continuous.

The above fuel treatments may have a significant short term impact on air quality given the slow ignition and high fuel moistures. As a result of the inefficient combustion these treatments are usually conducted during spring conditions when atmospheric conditions promote ventilation.

Pile burning (machine or hand): This is a relatively inexpensive treatment used to dispose of woody debris. Employing top attached yarding methods, woody debris is removed from sites to roadside landings or hand piled on site where the woody debris can be burned safely and inexpensively. Pile burning is conducted in late fall and compared to underburning reduces smoke emissions from 25 to 50 percent and increases combustion efficiency as much as 95 percent (D. Ward, 1992).

In addition to fuel treatments using prescription fire, other non-fire fuel treatments would be utilized:

Lop and Scatter: Branches are cut from felled trees to a predetermined height then scattered to reduce fuel concentrations. The objective is to rearrange the fuel so as to eliminate concentrations and break up vertical and horizontal continuity. Generally this treatment hastens natural decomposition and improves esthetic qualities of the treated area.

Trampling: Fuel is treated by crushing through various methods. Trampling is utilized on areas where fuels are relatively light and is limited by slope, usually areas that are harvested with a machine. The objective is to mix fuel with soil to hasten decomposition and provides for nutrient cycling.

Fuelbreaks (hand/machine/ridgetop): This is a strategically-located strip or block of land where the fuel is modified to reduce fire behavior potential. Use of fuelbreaks are designed to interrupt the continuity of heavy, hazardous fuel so fires burning to them can be readily controlled. They are pre-attack installations that provide safer, easier and faster control efforts for fighting fire. Generally this treatment provides holding area and accessibility for fire suppression forces and it also reduces potential fire damage to adjacent resources.

Top-attached yard: Trees are yarded out of the woods with the top attached to the top log. The top and limbs are severed from the merchantable bole at the log landing and placed in piles for burning. Burning can be done later or commensurate with logging.

Cumulative Effects

The monitoring of air pollutants during prescribed burning seasons is used to eliminate burning during times when such activities would result in violations of the State standards, including unacceptable impacts to non-attainment areas. The Forest Service voluntarily ceases burning operations to avoid violations of State standards. The monitoring of air pollutants during prescribed burning periods have not recorded any violations of the State standards to date. Burning of activity-created fuels would occur primarily in early spring when demand for airspace has been historically low. Smoke and particulate matter flows to the northeast and dissipates rapidly during good to excellent dispersion days.

Foreseeable Future Actions

Appendix E contains a list of reasonably foreseeable and ongoing activities in the project area. Smoke produced from fuel treatments would compete with other activities within the airsheds. Activities such as agricultural field burning, other forest residue burning, residential wood stove use, motor vehicle-produced exhaust and dust, and even dust from the Palouse and Columbia basin all produce pollutants that contribute to degradation of air quality.

Effects of Opportunities

Implementation of the opportunities described in Chapter II would not effect air quality.

Ecosystem Burning: Stands where the opportunity exists for wildlife/ecosystem burning were included and analyzed in Alternatives D, F and G. These prescribed burns are proposed to meet multiple resource objectives for increasing wildlife forage, reducing fuels, and reducing encroaching fir on drier sites. Effects of treating these stands are discussed under the alternatives.

Other Opportunities: There would be no effect on air quality from implementation of other opportunities described in Chapter II.

Consistency With the Forest Plan and Other Applicable Regulatory Direction

The Forest-wide objectives for air quality include maintaining excellent air quality on the Forest and to protect local and regional air quality by cooperating with the Montana Air Quality Bureau in the Prevention of Significant Deterioration (PSD) Program and the State Implementation Plan (SIP). Requirements of PSD, SIP and the North Idaho/Montana Smoke Management Plan will be met. The project meets the Clean Air Act through coordination with the State prior to burning, and the use of burning techniques that minimize smoke emissions.

Smoke Management for air quality is monitored by the North Idaho/Montana Airshed Group. The Idaho Panhandle National Forests coordinates and schedules burning activities to maintain air quality. The Coeur d'Alene River District implements burning projects in Airshed #11. Burning plans addressing smoke management are prepared by qualified personnel.

Prescribed burning is consistent with State laws requiring treatment of activity created fuels to reduce the effects of catastrophic forest fires.

WILDLIFE

REGULATORY FRAMEWORK

The regulatory framework providing direction for the protection and management of wildlife habitat comes from the following principle sources:

- *Endangered Species Act of 1973 as amended (ESA),*
- *National Forest Management Act of 1976 (NFMA), and*
- *Forest Plan for the Idaho Panhandle National Forests*

Section 7 of the Endangered Species Act directs Federal agencies to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any Threatened or Endangered species or result in the destruction or adverse modification of their critical habitat.

NFMA provides for balanced consideration of all resources. It requires the Forest Service to plan for diversity of plant and animal communities. Under its regulations the Forest Service is to maintain viable populations of existing and desired species, and to maintain and improve habitat of Management Indicator Species.

The Forest Plan, in compliance with NFMA, establishes Forest-wide management direction, goals, objectives, standards and guidelines for the management and protection of wildlife habitat and species, including old-growth habitat, Management Indicator Species, Sensitive species, and Threatened and Endangered species.

Direction concerning implementation of the Endangered Species Act and National Forest Management Act can be found in Forest Service Manuals and various letters/memos from the Washington Office, the Regional Office and the Supervisors Office.

AFFECTED ENVIRONMENT

Introduction

Wildlife populations and habitats do not stay constant over time. Habitat changes result in population increases or decreases, depending on the species. Wildfires, fires set by Native Americans, and insect and disease outbreaks were the primary disturbances and natural processes affecting habitats in the assessment area.

Low intensity, frequent fires maintained open understories in ponderosa pine and dryer Douglas-fir habitats. Western white pine, whitebark pine, ponderosa pine and western larch forests were more abundant than today, especially those in an old-growth condition. Historically, these trees provided important habitat for birds, bats, bears and other wildlife that use large snags and logs.

Old and Mature Forest

Many wildlife species occurring on the IPNF prefer or only occur in mature and old-growth forests. Mature and old forests are more likely than younger forests to provide habitat for species which prefer large trees, structural and biological diversity, and closed canopies, and/or which depend on snags or down logs for nesting, foraging or raising their young. Existing structurally immature stands could provide old-growth habitat over time if not disturbed or if managed to maintain large, old, diseased and dead structural components of the forest within the levels needed to provide suitable habitat.

Old-growth and mature trees and stands have been reduced in amount and patch size across the Coeur d'Alene drainage. Approximately 6% of the basin is currently identified as old growth; historically there was a range of 10 to 25% old growth in the basin. The Columbia Basin Assessment lists those species considered at risk that depend on or prefer natural structural conditions associated with old and mature forests (such as open-grown ponderosa pine). Some of these include the flammulated owl, boreal owl, Vaux's swift, and Lewis' woodpecker. Most species identified as "Sensitive" by the Forest Service are associated with later successional habitats, or habitats and cover types in short supply (such as cottonwood communities, large standing dead trees or large downed trees.)

Dry Forest Habitats

These habitats have evolved through low-intensity ground fires that occurred frequently (every 20 to 35 years). To protect human developments and future timber resources, fires have been suppressed, allowing smaller shade-tolerant trees to become established under the canopy of the dry site species. This has changed the structure of what was traditionally open-grown forest into dense, multi-canopied forests with more tree species diversity and greatly increased crown-fire hazard.

Some wildlife species prefer open, dry forests with large trees. Flammulated owls, pygmy nuthatches, white-headed woodpeckers, western bluebirds and Lewis' woodpeckers are a few examples. Forests which have developed a dense understory of grand fir or other shade-tolerant conifers are no longer suitable for these birds. Some species, including goshawk and flammulated owls, prefer gentle slopes more than steeper dry sites.

Snags and Dead Down Woody Habitat

Over 40 wildlife species depend on snags (dead trees) for their forage, cover or a place to raise their young. Sensitive species which nest in snags include flammulated owls, black-backed woodpeckers and boreal owls. Black-backed woodpeckers also feed on insects in snags. Snags provide den sites for fishers and other mammals, and roosts for several species of bats and owls. Not all species of snags are used by all snag-dependent wildlife species; some tree species appear to be more important than others. Large-diameter snags provide habitat for the greatest variety of cavity users and remain standing longer than smaller snags. Ponderosa pine and larch tend to last longer than other species. Many birds which nest in snags promote forest health by controlling forest insect pests.

The amount of snags and down woody material present has been identified as a measure of forestland integrity (Quigley et. al. 1996). Many wildlife species depend on dead trees for nesting, roosting, denning, foraging, resting, or shelter. These include primary cavity nesters (woodpeckers and nuthatches), which have the ability to excavate cavities in snags; and secondary cavity users (many species of birds and mammals), which use existing cavities for nesting, denning or shelter. Providing numbers of snags that have been shown to support viable populations is a prudent approach to managing for viable/sustainable populations of woodpeckers and other species which use snags and logs. Recent studies indicate that viable woodpecker populations occurred in areas with about four snags per acre (Bull et al. 1997).

After snags fall and become logs on the forest floor, they are still important to many wildlife species. They provide travel corridors and cover for rodents and other mammals, reptiles and amphibians. Hollow logs are used as den sites by many species. Lynx, boreal toad, marten, turkey and snowshoe hare are a few of the species which favor habitats with an abundance of down logs.

In addition to snags, living trees with decay, hollow trees and broomed trees are important to many wildlife species and are an integral part of the natural processes and functions of forested ecosystems.

Timber harvesting and firewood gathering are common activities in the forest. Forest management typically selectively harvests the dying, diseased and dead trees for timber harvest, so most stands have fewer snags

and dying or diseased trees after a timber sale. Snags are often felled during forest management activities because they pose a safety threat to forest workers.

Salvage logging after fires also removes snags from the landscape. Salvage logging targets recently-killed trees which have not had sufficient time to develop the decayed condition which is preferred by many snag-dependent species. Snags and down logs are preferred over live trees by many people who cut firewood, and corridors along open roads often have few snags. Once large snags are removed, it may be 100 years before a regenerated stand can grow new trees and produce snags large enough to meet the needs of most snag-dependent wildlife species.

Wildlife in the IPNF evolved with periodic outbreaks of a variety of insects and diseases. The outbreak of Douglas-fir beetle and tree mortality provides the opportunity to recognize and retain habitat components that support a host of wildlife species. It is intuitive that species associated with old growth and snags are probably less abundant than historically. With that in mind, the beetle outbreak can be viewed as an important change that could benefit many forest wildlife species and at the same time adversely affect other habitat components for some species (e.g. percent canopy cover).

Please refer to PNW-GTR-391, Bull, 1997 for more background and general management recommendations regarding snag-dependent species.

Security

Prior to European settlement, local inhabitants lived and traveled mainly in the major river bottomlands. Human developments and disturbance outside these bottomlands were minimal. Historically, all of the national forest was considered security for wildlife dependent upon it and animals moved freely across the landscape.

Recreation, mining, and timber management have all led to an increase in the number of roads which provide access for humans and impact security for wildlife.

Fragmentation

Predicted beetle mortality is causing the vast majority of landscape fragmentation in the project analysis area. The majority of selectively-logged stands would be maintained at or above 50% canopy closure, maintaining travel connectivity and reducing potential fragmentation. The majority of stands proposed for regeneration harvest would not be expected to maintain the canopy closure level needed for suitable habitat due to the beetle activity. In general, the regeneration harvest would not measurably fragment stands beyond what would occur due to the beetle activity.

On the Coeur d'Alene River Ranger District, approximately 14,500 acres that are infested or at high risk to beetle infestation would remain unharvested. These patches vary in size and are well distributed throughout the project area. Across the project area as a whole, there would be an estimated 50 patches between 50 and 100 acres in size left unharvested, 19 patches between 100 and 200 acres in size left unharvested, and 10 patches greater than 200 acres that would be left unharvested. Beetles will continue to create new patches over the next two to three years.

Design features that would apply to all alternatives would maintain connectivity and reduce fragmentation within the project area. Buffers under the Inland Native Fish Strategy would be implemented in riparian areas, ranging from 150 to 300 feet wide on either side of the stream, to maintain travel corridors for wildlife. Buffers implemented between old-growth stands and regeneration units would maintain the integrity of the old-growth stands. There would be no harvesting of old growth or old-growth replacement stands on the Coeur d'Alene River Ranger District. Harvest activity is proposed in old-growth stands on the Priest Lake

Ranger District to reduce the fuel loading, for long-term maintenance of the stand. The characteristics that comprise the old-growth structure would be maintained.

Road closure and/or obliteration is also proposed, which would have minor improvements to fragmentation.

Populations

Species which are associated with mature/old forest structure, snags, or that are sensitive to human disturbance, such as many Threatened, Endangered, and Sensitive species, were likely more abundant historically across the Idaho Panhandle and the Coeur d'Alene River drainage. The gray wolf, bald eagle and peregrine falcon are Threatened and Endangered wildlife species which may occur within the Coeur d'Alene River drainage. The lynx is a Proposed species that is likely to be listed as Threatened or Endangered by June, 1999. These species have decreased in population and distribution and occur in only portions of their former ranges on the IPNF; occurrence in the Coeur d'Alene River drainage is limited.

Human developments, habitat loss, fragmentation and disturbance have affected Threatened, Endangered and Sensitive species; hunted, trapped and wide-ranging species; and species associated with habitats outside the historical range of variability. As roads were built for mining and logging, previously secure habitats were opened to motorized traffic and other disturbances, leading to displacement of wildlife (from otherwise suitable habitat) and increased mortalities. Forest management has altered the amount and distribution of structural stages resulting in changes in the amount and distribution of suitable habitat and the populations of species which require or occur in these habitats.

Some populations are artificially controlled by humans. Idaho Fish and Game has transplanted elk, woodland caribou and mountain goats to augment low populations and increase distribution. Unlike carnivores, big-game species such as deer, elk and moose are more abundant now than historically, due in large part to continued creation of early succession foraging habitats through timber harvests, and Fish and Game's population management objectives.

Species Relevancy Screen

Some elements of wildlife habitat require a detailed analysis and discussion to determine potential effects on a particular species. Other elements may not be impacted; be impacted at a level which does not influence use, occurrence or the decision to be made; or can be adequately addressed through design of the project. These elements do not necessarily require in-depth analysis.

The level of analysis is dependent on a number of variables, including but not limited to the existing condition, the cause and effect relationship, the magnitude or intensity of effects, the contrast in effects between alternatives, the risks to resources, and the information necessary for an informed decision. The analysis is commensurate with the importance of the impact (CEQ 1502.15), the risk associated with the project, the species involved, and the level of knowledge already in hand (USDA Forest Service, 1992).

Threatened, Endangered and Sensitive species (including Proposed Sensitive species) and other Management Indicator Species that are known to occur on the IPNF were screened for their relevancy to the Coeur d'Alene drainage and the analysis areas by reviewing sighting records, planning documents and other sources, such as scientific literature. Relevancy was determined if there is evidence of species or habitat present within the affected area, and whether any such species or habitat could potentially be affected by the proposed actions. Species relevancy for this project is specific to the Coeur d'Alene drainage and the conditions/situation which exists in the drainage and the analysis areas.

Some habitat and species may occur within the Coeur d'Alene River drainage but may not be applicable to any or all analysis areas. A course filter screen was applied at the Coeur d'Alene River drainage level and then a finer filter screen was used to assess species relevancy at the analysis area level.

No further discussion or analysis is necessary for those species or suitable habitat that are not found within the assessment area. Additional rationale is provided in the project file ("Wildlife") for those species dismissed from further discussion.

Some wildlife species or their habitat are found to be present in the assessment area, but not measurably affected because they would not be impacted by the proposed actions, the impacts would be at a level which would not influence their use or occurrence, or their needs can be adequately addressed through the design of the project. Species determined to be not measurably affected are not discussed and analyzed. NEPA directs the agency to focus on a full and fair discussion of significant issues, and identify and eliminate from detailed study the issues which are not significant. Supporting rationale is provided in the following section for these species.

Table III-89. Species occurring within the affected project and analysis area, Coeur d'Alene River Ranger District.

Species	Species/Habitat Present?	Species further analyzed?	Supporting Rationale/ Documentation**
Endangered			
Gray wolf*	Yes	No	2
Peregrine falcon	No	No	1
Woodland caribou	No	No	1
Threatened			
Bald eagle	Yes	Yes	3
Grizzly bear	No	No	1
Proposed			
Lynx	Yes	Yes	3
Sensitive			
Black-backed woodpecker	Yes	No	2
Boreal Toad	Yes	No	2
Common loon	Yes	No	2
Coeur d'Alene salamander	Yes	Yes	3
Fisher	Yes	Yes	3
Flammulated owl	Yes	Yes	3
Harlequin duck	Yes	No	2
Northern bog lemming	Yes	No	1
Northern goshawk	Yes	Yes	3
Northern leopard frog	Yes	No	2
Townsend's big-eared bat	Yes	No	2
White-headed woodpecker	Yes	Yes	3
Wolverine	Yes	Yes	3
Management Indicator			
Elk	Yes	Yes	3
Marten	Yes	Yes	3
Pileated woodpecker	Yes	No	2
Other			
Boreal owl	Yes	No	2
Forest land birds	Yes	No	2
Snag habitat	Yes	No	2

**South of Interstate 90 gray wolves are classified as nonessential experimental populations; this classification treats wolves as Proposed for listing under the ESA.*

** *1 = Documentation is provided in the project file for the determination that the species or habitat is not present within the Coeur d'Alene drainage; no further analysis is needed.*

2 = Species or habitat may be present. Based on preliminary analysis it can be determined that the scope of the proposed actions - including design criteria - would not measurably affect habitat or the species (e.g. harvest of trees would not impact habitat for species associated with lakes); or effects do not warrant or require further analysis. Rationale is provided in the habitat relationships discussions in the "Reference and Existing Condition" section of this document.

3 = Species discussed and analyzed in detail.

Reference and Existing Condition

This section includes a brief discussion of the species habitat preferences and requirements based on scientific literature, information from the Geographic Assessment and site-specific information for the analysis areas. The indicators used to display potential effects on the species are developed based on this information.

An important concept in the existing condition descriptions and analysis is the difference between capable and suitable habitat. The following definitions are helpful in distinguishing between these two terms and the concepts upon which they are based.

Capable habitat refers to the inherent potential of a site to produce essential habitat requirements of a species. The vegetation on the site may not be currently suitable for a given species because of variable stand attributes, such as inappropriate seral stage, cover type, or stand density.

Suitable habitat is that which currently has both the fixed and variable stand attributes for a given species' habitat requirements. Variable attributes change over time and may include seral stage, cover type, stand density, tree size, stand age, or stand condition.

Threatened, Endangered and Proposed Species

Gray Wolf. The northern Rocky Mountain wolf (a subspecies of the gray wolf) was listed as Endangered in 1973. However, based on enforcement problems and a trend to recognize fewer subspecies of wolves, the entire species was listed as Endangered throughout the entire lower 48 states, except Minnesota, in 1978 (USDI 1987). In the past, substantial declines in numbers of wolves resulted from control efforts to reduce livestock and big game depredations. By the 1940's, the Rocky Mountain wolf was essentially eradicated from its range.

In 1994, final rules in the Federal register made a distinction between wolves that occur north of Interstate 90 and wolves that occur south of Interstate 90, in Idaho. Gray wolves occurring north of Interstate 90 are listed as Endangered species and receive full protection in accordance with provisions of the Endangered Species Act. Gray wolves occurring south of Interstate 90 are listed as experimental population, with special regulations defining their protection and management.

Wolves are highly social animals requiring large areas to roam and feed. Conservation requirements for wolf populations are not fully understood, but the availability of prey and limiting risk of human-caused mortality are considered key components (USDI 1987, Tucker et al 1990). The risk of human-caused mortality can be directly related to the density and distribution of open roads.

The Douglas-fir beetle project on the Coeur d' Alene River Ranger District has activities proposed north of Interstate 90. The project area is outside of a recovery area. Although surveys have not been conducted in the analysis areas, occasional visual sightings and scat found by the public and Forest Service employees over the years have been reported in and around the analysis areas of Hart and Steamboat. However, these sightings seem to indicate transient individuals or lone wolves. A pack of wolves has never been sighted. There are no known resident wolf packs or den sites in close proximity to the project area.

Wolves primarily feed on ungulates. The project area supports moose, elk, white-tailed deer and mule deer as potential prey items. Although no specific population numbers are available, ungulates are common and available enough to provide an ample prey base for wolves. It is highly unlikely that the prey population would limit wolf recovery because of the low number of wolves and the high number of ungulates in the project areas. In addition, the analysis areas on the western half of the district experience frequent winter disturbance from snowmobile use which may result in minor to moderate disturbance to big game.

The likelihood of affecting wolves is low since there are no known packs and no known sightings within the majority of the analysis areas. Approximately 20% of the winter range available within the analysis areas is proposed for harvest. If winter logging occurred, approximately 50% of the winter range would experience minor increased disturbance due to accessing units outside of winter range. To lessen effects in winter range of disturbance to big game, where winter logging occurs below 3,000 feet, there would be contractual controls to allow for an inactive place for big game to disperse (Hayden pers. communication, 1998; Leege, 1984). An analysis of cover:forage ratios found no detectable changes from the existing condition either from the Douglas-fir beetle canopy mortality or harvest activity. It is unlikely that the prey population limits the gray wolf given the high numbers of prey availability. For further information on big game habitat, refer to the big game section. For information on open road densities, refer to the fisher section.

Rationale for no further analysis: Analysis shows that design features would adequately protect big-game populations, and there would be no measurable change in wolf habitat. This project may have a minor increase in disturbance short term above the existing levels and affect wolves by temporarily displacing big game. In the long term, under all alternatives, reduced open road densities and/or improved closures would slightly to moderately decrease the risk of human caused mortality and increase habitat for big game. The maintenance of an adequate prey base and reduction in open road densities would continue to provide habitat for wolves. Therefore, this project may affect but would not likely adversely affect gray wolves or their habitat.

Bald eagle. All of the area covered by this Final EIS is included in Zone 7 as designated in the Pacific States Bald Eagle Recovery Plan. At the time of federal listing, bald eagles were uncommon in this zone. Recovery has progressed considerably in Zone 7. Currently, key areas in northern Idaho have contributed enough new territories to reach and exceed goals listed in the Recovery Plan.

Bald eagles are winter visitors and year-long residents of northern Idaho and northeast Washington. They are attracted to the area's larger lakes and rivers which provide most of their foraging opportunities (i.e. fish, waterfowl). Accordingly, bald eagles select isolated shoreline areas with larger trees to pursue such activities as nesting, feeding, loafing, etc. Nesting habitat include proximity to sufficient food supply, dominant trees, and within line-of-sight of a large body of water (often within 0.25 mile of water). Nest trees typically are large ponderosa pine, Douglas-fir, western larch or cottonwood trees with open crowns in areas that are relatively free from human disturbance (Montana Bald Eagle Working Group, 1991).

Perch sites, roost sites and access to prey are the essential components of winter habitat. Bald eagles generally use traditional communal roost sites in the winter, especially during periods of severe weather. Roosts are often located in large trees at the head of sheltered draws that provide protection from wind and inclement weather. Although proximity to food resources is not critical, roosts are often in the closest available forest stand. Roosts at greater distances from food sources would require more energy expenditure (Montana Bald Eagle Working Group, 1991).

Reference Condition: Historical records document the abundance of bald eagles in the Pacific Northwest states during the late 19th century. Populations of nesting eagles in the Coeur d'Alene drainage were probably much higher than current levels. Later, records suggest a population decline may have occurred at the beginning of the twentieth century. Direct persecution and habitat destruction reduced populations. Persistent forms of pesticides such as DDT have been a major factor in declines in the eagles population. More recently, urban development and home construction along Coeur d'Alene Lake, Hayden Lake and the Coeur d'Alene River continue to destroy habitat for the bald eagle.

Existing Condition: The majority of wintering eagles leave their nesting areas and congregate on unfrozen open water because of forage availability. These include Lake Pend Oreille, Pend Oreille River, Kootenai River, and Lake Coeur d'Alene. Only a limited number of winter roost sites are known in this entire area, despite annual aerial winter counts. The highly vegetated shorelines are likely to provide adequate protection

such that habitual roosts appear to be generally unnecessary. Of the three known roosts associated with Lake Coeur d'Alene, two roosts are within 0.5 miles, and one is 1 mile from the associated water body (pers. comm. with S. Robinson, BLM wildlife biologist, to S. Jacobson, April 14, 1999). Of the three known winter roost sites associated with Lake Pend Oreille, two sites are less than 0.1 mile from shoreline and the other is approximately 0.1 mile from shoreline (Crenshaw 1987). For further information on the existing condition by analysis area, refer to the overviews in the bald eagle section.

Lynx. Lynx in North America occupy regions of arctic or boreal influence. They are restricted to forested habitats within this region and are found from western Alaska to the eastern edge of New Foundland. The northern boundary of this range coincides with the northern extension of the boreal forests. The southern boundary of lynx range is along the high-elevation or boreal forested areas of the Cascades and Rocky Mountains into Washington, Idaho, Montana, Wyoming, Colorado, and Utah.

Lynx are considered low-density species with home ranges averaging 24 square miles, depending on prey abundance. They occur primarily in moist, cold habitat types above 4,000 feet in the Coeur d'Alene River drainage (Weaver, personal communication, 1998). Even though lower elevations can be important in some instances, evidence suggests lynx tend to use these areas less because of competition with other predators and overheating in the summer.

Lynx habitat in the western mountains consists primarily of two structurally different forest types occurring at opposite ends of the stand age gradient. Lynx require early successional forests that contain high numbers of prey (especially snowshoe hare) for foraging and late-successional forests that contain cover for kittens (especially deadfalls) and for denning (Koehler and Aubrey in Ruggiero et al., 1994, p. 86). The highest use occurs when these are in close proximity. Like most wild cats, lynx require cover for security and stalking prey; they avoid large open areas. Although lynx may cross openings less than 100 meters in width, they generally do not hunt in these areas (Koehler and Aubrey in Ruggiero et al., 1994, p. 88). Lynx tend to avoid continuously steep, dissected areas.

Reference Condition: The lynx is one of the three species of wild cats that occur in the temperate forests of North America. Lynx populations in Alaska and most of Canada are generally considered stable. The conservation of lynx populations is the greatest concern in the western mountains of the United States because of the peninsular and disjunct distribution of suitable habitat at the southern periphery of the species' range. Both historic and recent lynx records are scarce, which makes identifying range reductions and determining the historical distribution of stable populations in the region difficult (Ruggiero 1994). Low elevations, lack of spruce fir habitats and highly dissected lands in the Coeur d'Alenes inherently provide marginal habitat for the lynx.

Existing Condition: The Coeur d'Alene Basin does not have an abundance of habitat for lynx. Generally, the country is steep and dissected. Stands that provide for lynx habitat occur on this district above 4,000 feet (Weaver pers. comm. 1998) , with the Idaho Montana border providing the largest amount of habitat on the district. None of the analysis areas are located along the Idaho/Montana border. The majority of the wildlife analysis acreage is below 4,000 feet. The Hayden and Coeur d'Alene Lake North analysis areas provide the largest amounts of habitat.

On July 8, 1998, the U.S. Fish and Wildlife Service published a proposal to list the lynx under the Endangered Species Act of 1973, as amended. In effort to address management of lynx, the following protocols are used as the most current information to evaluate effects on lynx habitat and facilitate Section 7 conferencing and consultation with U.S. Fish and Wildlife Service:

- *Within lynx habitat, no more than 30 percent of lynx habitat can be unsuitable at any time. Management activities would not change more than 15 percent of lynx habitat into unsuitable condition within a 10 year period.*
- *Within a lynx habitat, maintain denning habitat on a least 10 percent of the area that is capable of producing stands with these characteristics. Denning habitat should be well distributed and in patches larger than 5 acres.*
- *Manage for no net increase in open road miles in lynx habitat. Allow no net increase of regularly used or groomed over-the-snow routes and play areas.*
- *Maintain vegetative structure that facilitates movement of lynx along important connectivity corridors (e.g. riparian areas, saddles, ridges).*

Sensitive Species

Black-backed Woodpecker. Black-backed woodpeckers are found most often in forests where there are insect outbreaks as a result of fire or other events. They nest in snags or in live trees with heart rot which are at least 5 inches in diameter. They often use clumps of snags for nesting, and are known to nest in spruce, lodgepole pine, aspen, ponderosa pine, Douglas-fir, and western larch (Thomas 1979, p. 381; Harris 1982, p. 52, 53, and 60). Black-backed woodpeckers feed primarily on wood-boring beetles and concentrate on large areas of recently killed, beetle-infested timber. Breeding densities of black-backed woodpeckers vary considerably in response to prey availability, increasing up to 7 times the normal level during beetle epidemics (Jackman 1975, p. 101). They are specialists in exploiting recent forest fires, especially for the first 3 to 5 years after burning, and rapidly utilize new burns (T. Layser, pers. comm. 1995, Hutto, 1995). Historically, mixed severity and stand-replacing fires produced new habitat annually, in greater amounts than is produced under current fire suppression strategies.

Rationale for No Further Analysis: The project includes design criteria intended to maintain a minimum number of snags distributed across the harvest units. These guidelines would retain snags in addition to the tremendous number of snags that are being created by the Douglas-fir bark beetle across the Coeur d'Alene Basin, north Idaho and northeastern Washington. Snag recruitment outside of the beetle activity area is primarily in the smaller size classes of snags, which are used more by black-backed woodpeckers than some other snag-dependent species dependent on larger snags (see pileated woodpecker and white-headed woodpecker accounts). For these reasons, the project would contain design criteria and mitigation measures to adequately protect and maintain appropriate habitat for black-backed woodpeckers.

Analyses found that an estimated 14,500 acres may provide additional snags that would not be harvested in association with this project. Maintenance of these snags would avoid long-term impacts to the black-backed woodpecker. Please refer to the map under "Snag and dead down woody habitat," which displays snag distribution across the analysis areas. There may be impacts to individual black-backed woodpeckers because harvest activities may reduce some of the habitat available for potential population increases that occur due to the Douglas-fir beetle infestation. Under all alternatives, there would be an increase in habitat compared to the existing condition.

Boreal toad. Boreal toads require shallow water in ponds, lakes or slow-moving streams for breeding sites. Boreal toads lay their eggs in the warmest water available, typically less than 20 inches deep (Corkran and Thoms, 1993, p. 86). Beaver ponds are often used for breeding. This species does not require much aquatic or emergent vegetation in its breeding habitat. After the brief spring breeding season, adult toads leave aquatic

habitats and travel to a variety of upland habitats. Radiotelemetry research on boreal toads in southern Idaho found that toads can travel up to 2 kilometers (about 1 mile) from their natal ponds; it also showed that toads avoided crossing clearcuts (Bartelt, 1994). Boreal toads in Colorado have been documented traveling up to 2.5 miles away (Loeffler, 1998).

Tadpoles take at least 2 months to develop before they metamorphose into juvenile toads and disperse from the breeding site into nearby upland habitats. Juveniles disperse from their natal ponds in late summer. The timing of dispersal depends on water temperature; in warmer water, tadpoles and juveniles mature faster. Much of the year toads are away from ponds in terrestrial forest and non-forest habitats. Toads hibernate in the winter in habitats which maintain a high humidity and above-freezing temperatures. Areas that provide shelter for hibernating toads include rodent burrows, beaver dams and slash piles. It is important that toads be able to move among their seasonal habitats. According to Nussbaum et al., optimal habitat probably has moderate to dense undergrowth in more humid regions. The biggest potential barrier to their movements is roads. Steep roadcuts can be a barrier to toads moving between seasonal habitats. Juvenile toads are vulnerable to being killed by motorized vehicles when they are dispersing from their natal ponds.

Rationale for No Further Analysis: Preliminary analysis shows that Inland Native Fish Strategy guidelines concerning riparian habitat conservation areas within 150 ft. of the edge of wetlands would prevent sedimentation of toad breeding habitat. Road removal or improvement would benefit toads by eliminating a potential sediment and mortality source near the wetland. It was determined that there were adequate design criteria to protect boreal toads and their habitat.

Common loon. Loons are large, heavy-bodied birds with their legs and feet positioned far to the rear. This allows them to propel quickly under water but renders them unable to walk well on land or to take off without a long expanse of water. They require lakes of at least 10 acres in order to gather enough speed to take off. Lakes suitable for nesting are 10 acres or larger with emerging shoreline vegetation and secluded areas for nesting and brood rearing (USDA Forest Service, 1989). Loons have been sighted on Coeur d'Alene Lake and Fernan Lake.

Rationale for No Further Analysis: Since loons are located on lakes, the proposed actions would not affect habitat for loons. No further analysis and discussion is necessary for this species.

Coeur d'Alene salamander. Coeur d'Alene salamanders are restricted to cool, damp aquatic habitats that have stable temperatures and moisture levels. The species has been found in three major types of habitats in northern Idaho: spring seeps, waterfall spray zones and along stream edges between 1,800 to 3,500 feet elevation. Known populations have only been located at sites where the presence of fractured bedrock, combined with relatively high substrate moisture, high relative humidity, and moderate air temperatures create favorable habitat conditions. These conditions are critical for Coeur d'Alene salamanders since they breathe through the skin and lose water to the environment through evaporation (Groves 1989).

Reference Condition: The Coeur d'Alene salamander is a remnant of a once diverse salamander fauna in the northern Rocky Mountains that was likely reduced by climatic changes over the last 10-14 million years. The species has a patchy distribution below 5000 feet in northern Idaho. Surveys have found some known populations extinct due to roads, landslides, heavy metals and extensive logging. Historically populations were probably higher in the Coeur d'Alenes and have been reduced by the past actions of man.

Existing Condition: There are known populations of Coeur d'Alene salamanders in the Coeur d'Alene Lake Analysis Areas (both North and South). No populations have been documented in the Chain Lakes, Steamboat or Bumblebee Analysis Areas, although populations have been located in adjacent areas, so it is likely that Coeur d'Alene salamanders occur within these three analysis areas as well. There are no known populations in the Hart or Hayden Analysis Areas, although potential habitat may exist in creeks and mines in the Hayden area.

Fisher. (Note, also see American Martin discussed later under Management Indicator Species) Fisher are medium-sized mammalian carnivores. They tend to be opportunistic predators, eating anything they can catch. Their major prey tend to be small to medium-sized mammals, birds, and carrion. Fishers are found only within North America and presently occur from southern Canada south into the northwestern states, California and the Great Lake States. Fishers occur most commonly in landscapes dominated by mature to old-forest cover. Within the Pacific states and Rocky Mountains they appear to prefer late-successional coniferous forests in the summer and mid to late-successional forests in winter.

Fishers prefer habitats with high canopy closure (greater than 80 percent) and avoid areas with low canopy closure (less than 50 percent) (Powell, 1982). They also have been known to use riparian areas. In north-central Idaho, grand fir and spruce forests were preferred by fishers (Jones, 1991), in elevations from approximately 3,000 to 5,000 feet. The habitat requirements of fishers are thought to be associated with the physical structure of the forest and associated prey. This structure includes the vertical and horizontal complexity created by a diversity of tree sizes and shapes, light gaps, dead and downed wood and layers of overhead cover. Large-diameter spruce and grand-fir snags and large downed material are used for denning and foraging. Fishers tend to avoid non-forested areas. The home ranges for fishers vary with prey densities. Studies indicate that the average home range for adult males is 40 square kilometers; this is nearly three times that of females, which is 15 square kilometers.

Fishers tend to avoid human presence and generally are more common where there are fewer people and less human disturbance. Fishers are easily trapped. Where populations are low, fisher populations can be jeopardized by the trapping of coyote, fox, bobcat and American marten (Ruggiero et al., 1994). Habitat security in the form of low road density reduces the risk of this mortality because trapping areas are reduced.

Reference Condition: No accurate estimates or records exist for historic wildlife populations of fisher or American marten in the analysis areas. Hudson Bay trapping records indicate that furbearers, including these two species, were trapped in the area, particularly in the northern portion of the Coeur d'Alenes. It would be reasonable to infer the numbers of animals were greater than what occurs currently given the number of records within the last 10 years in the Geographic Assessment area.

Existing Condition: Extensive alteration of forest structure as a result of natural and human-caused disturbances (i.e. reduction in canopy closure, snags, old growth, and down woody material) has altered the habitat value for fisher and marten. Generally, the openings created by human development and timber harvesting have reduced denning habitat value, whereas the increase in canopy cover brought about by fire suppression has expanded denning habitat quality.

Flammulated owl. Flammulated owls are seasonal migrants that occupy home ranges in the northern latitudes during the spring, summer and fall. They depend upon naturally-occurring or excavated cavities for nesting. Consequently, snags and other defective trees are an important component of their breeding habitat.

These owls are attracted to relatively open, older forests featuring ponderosa pine and Douglas-fir that are correlated with drier habitats. Reynolds and Linkhart (1992) reported that all published North American records of nesting except one came from forests in which ponderosa pine was at least present, if not dominant. The flammulated owl's preference for ponderosa pine and/or Douglas-fir can also be linked to prey availability. Reynolds and Linkhart noted a stronger correlation between prey availability and ponderosa pine and Douglas-fir, than with other common western conifers.

Reference Condition: Historically, the project area provided optimal flammulated owl habitat, primarily on dry habitats at lower elevations. No populations numbers exist for this species' historic condition; however, a geographic assessment of the Coeur d'Alene River basin determined that the historic amounts of dry site large/mature and old-growth ponderosa pine and Douglas-fir were much more numerous than currently. This is due to several reasons. Low intensity wildfires that maintained these stands in suitable conditions for

flammulated owls have been essentially eliminated by aggressive fire suppression. Timber harvesting has fragmented stands into smaller patches. These lower elevation, low gradient areas are also suitable for human development. These factors have dramatically reduced the amounts of suitable habitat for this species.

Existing Condition: Approximately 95% of suitable habitat has been reduced within the Lower Clark Fork Ecological Unit; the Coeur d'Alene drainage is part of this ecological unit (Wisdom, in press). Much of the habitat loss is due to urban and agricultural development on low elevation private lands outside the forest boundary.

Harlequin duck. Harlequin ducks winter on the ocean and migrate inland to breed. They are generally associated with fast-flowing streams which are greater than 10 meters wide or greater during the breeding season (Cassirer and Groves, 1990, p. 8). Harlequin ducks are primarily affected by disturbance within two "sight distances" of a nesting stream (Cassirer et al, 1996). A sight distance is equal to about 200 feet, depending on the density of streamside vegetation.

The risk factors for harlequin duck are those associated with changes in nesting habitat integrity, including disturbance during nesting season. Water quality standards relative to harlequins are primarily to protect their invertebrate food base; water quality standards to protect cold water biota should either maintain or improve water quality. Bumblebee Analysis Area is the only analysis area that has potential harlequin duck habitat. Approximately 97% of suitable habitat for harlequin duck is located within the Lower Clark Fork Ecological Recovery Unit, which includes the Coeur d'Alene River drainage (Wisdom, in press).

Rationale for No Further Analysis: There would be no activities under any of the alternatives that would affect harlequin duck habitat or cause a change in streamflow. Water quality is expected to be maintained or improve under all action alternatives (please refer to the "Watershed" section for a detailed discussion on water yield). Harvest and watershed restoration activities (i.e. culvert removal) may increase sediment in localized areas, but no measurable effect would be expected. Road-related activities associated with the proposal would reduce existing risks to water quality. For these reasons, the risk factors to harlequin ducks have been avoided or mitigated through design features. Therefore, no further analysis or discussion is warranted.

Northern goshawk. Goshawks have habitat requirements associated with components and attributes of late successional forests (USDA, 1990). While associated with mature to old growth habitat, they utilize other successional stages. For example, feeding habitat can be found in pole-sized timber stands. Habitat features important to goshawk are those which influence nest site selection and food availability. Regeneration harvest would reduce nesting (and feeding) values to zero. Reductions in canopy cover (either from stand decline or treatment) would reduce the feeding value.

Reference Condition: Much of the historic conditions noted for flammulated owls apply to northern goshawks as well. Historic numbers of goshawks were likely higher than they are today, because many of the species they prey upon were likely more numerous. This is because the habitat of their primary prey species was more plentiful than today.

Existing Condition: The Geographic Assessment for the Coeur d'Alene River basin indicates a greater proportion of old growth was present in the Coeur d' Alene Mountains than currently occurs. Old growth is important for northern goshawks not only for prey species habitat but also for the large trees that provide the substrate for their substantial nest structures.

Another factor influencing the amount of goshawk habitat is the amount of understory vegetation that this generally mesic area produces. Because northern goshawks require a combination of adequate understory to provide prey species, and adequate clearance for flight maneuverability, some stands that historically were suitable for foraging are no longer suitable because of increased density of understory.

Northern leopard frog. This species occupies marshes, wet meadows, riparian areas and moist, open woods. Leopard frogs apparently require a moderately high ground cover for concealment (Nussbaum et al., 1983, p. 128) Because this species attaches its eggs to aquatic vegetation, it prefers ponds or lakeshores which have fairly dense aquatic and emergent vegetation during the spring egg-laying season. Breeding habitat typically has water at least 20 inches deep (Corkran and Thoms, 1986). This species probably hibernates in ponds and lakes.

Rationale for No Further Analysis: Preliminary analysis shows that Inland Native Fish Strategy guidelines concerning riparian habitat conservation areas within 150 ft. of the edge of wetlands would prevent sedimentation of frog breeding habitat. Road removal or improvement would benefit frogs by eliminating a potential sediment and mortality source near the wetland. It was determined that there were adequate design criteria to protect northern leopard frogs and their habitat. Therefore, no further analysis or discussion is needed.

Townsend's big-eared bat. Caves and cave-like structures are critical habitat for this species, both for hibernating in the winter and as roosts for summer nursery colonies (Nigorson and Brigham, 1993). They occasionally use bridges and old buildings for roosting and in some places have been known to use building attics as nursery sites (Perkins, 1992, page 9). Since caves are rare in North Idaho, Townsend's big-eared bats primarily roost in abandoned mines. This species prefers caves and mines within a narrow temperature range. It is important to maintain these temperatures in suitable habitat. Over 1,000 mines occur on the Idaho Panhandle National Forests, most of them in the Central and South Zones, thus providing greater habitat than was historically available. This bat is typically found in shrub-steppe or forest edge (Notes of Montana Bats, 1992). Foraging habitat is not well known but preliminary data suggests they forage along cliff faces and along small stream corridors in forested habitats (Perkins, personal communication). Other foraging habitat may include forest edges and openings, riparian areas where flying insects are abundant and where there are no obstructions to flight.

Loss and disturbance of areas for hibernating and roosting is the limiting factor for Townsend's big-eared bats. On the Coeur d'Alene River Ranger District there are three known mine sites in close proximity to proposed activities.

Rationale for No Further Analysis: The known mine sites in the Coeur d'Alene Lake (North and South) and Chain Lakes analysis areas would be surveyed. If Townsend's big-eared bats are found in these mines, the Habitat Conservation Assessment and Conservation Strategy for Townsend's big-eared bats would be applied (Idaho State Conservation Effort 1995). This would protect the bats from disturbance and maintain surrounding forest vegetation which regulates the temperature regime in the roost which makes it suitable for Townsend's big-eared bats. For these reasons, it is unlikely the project would have measurable impacts on the Townsend's big-eared bat. Therefore, no further discussion and analysis is necessary.

White-headed woodpecker. The white-headed woodpecker is restricted to drier forest types dominated by pine trees in the mountains of far western North America. Abundance appears to decrease north of California. They are generally uncommon or rare in Washington and Idaho and quite rare in British Columbia.

Modern forestry practices such as clearcutting, snag removal and fire suppression have fragmented forests and contributed to local declines of the species, particularly north of California (Kimball et al. 1996). However, this species persists in burned or cut-over forests with residual snags and stumps; thus populations are more tolerant of disturbance than those species associated with closed-canopy forest (Raphael et al., 1987).

Rationale for No Further Analysis: Because of habitat similarities with flammulated owl, the white-headed woodpecker would be treated as a guild with flammulated owl in this document.

Wolverine. Wolverines are low density, wide-ranging species that inhabit remote forested areas, ranging over a variety of habitats. Wolverines tend to use lower elevations in the winter and higher elevations in summer, when these areas provide the greatest potential food supply (Hornocker and Hash 1981).

Wolverine mortality caused by interaction with humans is considered one of the primary limiting factors in wolverine populations. Improved access increases the potential for interaction with people, which can lead to shooting loss or incidental take by trapping. Wolverines are occasionally taken by trappers focusing on other furbearers such as bobcat and marten.

Other factors with the potential to threaten local population viability of the species include reduction of "wilderness refugia" (large areas of habitat with limited human access), natural reserves and food availability (Butts, 1992).

Reference Condition: When the first Europeans arrived in North America the wolverine was present everywhere in the northern terrain that stretches from Maine to Washington and south along the Sierra Nevada and Rocky Mountains. The wolverine, with its dependence on wilderness, was pursued both as a predator that threatened domestic animals and to some extent its pelt. In the Rockies the wolverine was steadily forced back into the wildest and most inaccessible areas. Wolverines always occurred at low densities across its range, including the Coeur d'Alene Mountains. However, encroachment by man and incidental trapping have further reduced those numbers. Idaho is experiencing a limited increase in wolverine numbers. This is also reflected in the recent sightings on the Coeur d'Alene River Ranger District.

Existing Condition: Based on their wide-ranging nature and existing habitat components (i.e. lack of both denning habitat and large sparsely inhabited wilderness areas) and sighting information, recorded wolverine occurrences in the Coeur d'Alene River drainage are likely transient individuals. There is no wolverine denning habitat within or adjacent to the project areas on the Coeur d'Alene River Ranger District. Risk of disturbance during the sensitive denning period is not a factor in this project. Relatively high road densities in the Coeur d'Alene drainage (on both National Forest and non-national forest lands) limit the drainage's suitability as wolverine habitat. Preliminary analysis revealed that the minor changes in open road densities would not measurably affect wolverine. Therefore, no additional analysis is necessary.

Management Indicator Species

American Marten. The marten is a solitary carnivore that inhabits mature stands of coniferous forest throughout North America. In the western United States, marten are most abundant in mature to old-growth true-fir or spruce-fir forests and generally avoid open, drier coniferous forests (USDA 1990). They prefer forest stands greater than 40 percent tree canopy closure, which protects them from predators and enhances the moist conditions favorable for prey species (Clark et al. 1989). American marten are easily trapped and are vulnerable to overharvest in areas accessible by trappers. Regulations regarding trapping are beyond the scope of this analysis.

Rational for No Further Analysis: This species is in the same guild as the fisher. Any changes in fisher habitat are the same for marten. Refer to fisher analysis for impacts to the marten.

Elk. White-tailed deer, moose and elk inhabit the analysis areas. Elk are the primary big game species using the area. Since elk are the Management Indicator Species for big game on the Central and Southern portion of the IPNF (Forest Plan, Appendix L, p. 5), the analysis for big game will focus on elk. Consequently, white-tailed deer can adequately be represented by discussions on elk. The IPNF Forest Plan does not emphasize moose on the central and southern portion of the Forest.

Existing Condition: Elk are a species of social concern for management because they are regularly hunted on the Forest. Management for elk involves providing for thermal and hiding cover, and secure areas greater or

equal to 250 acres in size. Existing elk habitat potential is described in further detail in the "Environmental Consequences" discussion.

Reference Condition: Elk are now present in greater numbers than were present historically, partially due to reintroductions in the early 1900's (Idaho Fish and Game, 1997).

Pileated Woodpecker. This species nests and roosts in cavities in large diameter (20 inches diameter or greater) live or dead trees. It selects nest trees in clumps of snags in stands with at least 70% canopy cover (Bull and Meslow 1977). Research in Montana found that typical pileated woodpecker nest trees were in stands with a basal area of at least 100 square feet per acre (McClelland 1979, p. 283). Pileated woodpeckers feed on beetles, carpenter ants and other insects in live and dead trees, logs and stumps.

There is no direct population or habitat information available on historic numbers of pileated woodpeckers. From the forest structure information, it can be inferred that there were likely more pileated woodpeckers historically than there are currently. The number of large snags are believed to be fewer than historical numbers, because of the disproportionate amount of timber harvesting done in older stands, and the decreased amount of older stands remaining from stand-replacing wildfires in the early part of the century.

Rational for No Further Analysis: Design features for alternatives would assure that snags for pileated woodpecker would be maintained in harvest units under all alternatives. The project is designed to maintain at least the minimum number of snags needed to support woodpecker populations, distributed uniformly across the landscape (please refer also to the discussion on "Snags and dead down woody habitat," above). The minimum number of snags left in any unit with a canopy closure greater than 50% would be adequate to maintain a distribution of snags across the landscape. No treatments are proposed that would reduce old-growth structure or integrity where it occurs. For these reasons, it is unlikely the project would have measurable impacts on pileated woodpeckers. Therefore, no further discussion or analysis is necessary.

Other Species and Habitat

Boreal owl. Boreal owls occur in spruce/fir forests and associated high-elevation cedar/hemlock forests above 5,000 feet in elevation. Mature and old-growth conifer forests are suitable for nesting and foraging; forests with pole size or larger trees are also suitable as foraging habitat (USDA Forest Service, 1992). Nesting occurs in cavities in large snags at least 13-inches in diameter that have been excavated by pileated woodpeckers and northern flickers (Hayward, 1989). Mature and old-growth stands provide habitat for red-backed voles, gophers and flying squirrels, all important prey species for the owl. Younger stands are also used as foraging habitat during non-breeding periods.

Home ranges for boreal owls vary in size, but may cover as much as 2,200 acres or more. Home ranges can overlap extensively, but only a small area around the nest is actively defended during the breeding season (Hayward, 1989).

Rationale for No Further Analysis: Stands and areas impacted by the proposed actions lie below the preferred spruce-fir zone for boreal owls. Therefore, because capable or suitable habitat would not be affected, this project would not impact boreal owls. Between the Draft and Final EIS, the boreal owl was dropped from the Regional Forester's Sensitive species list. No further analysis and discussion is necessary for this species.

Forest land birds. Forest land birds include all the avian species sometimes collectively termed as "neotropical migrant birds" and "resident songbirds." This group of birds is not treated separately by species because they are an extremely diverse group of species, with widely divergent effects. Any treatment, including no action, affects some species in this group at the expense of others. It would be impossible to treat all the individuals in this group separately. However, some species are represented by other habitat elements in the species analyzed below, including dry site species (flammulated owl), boreal species (boreal owl),

riparian species (harlequin duck), lower seral stage species (lynx), wetlands (Coeur d'Alene salamander, northern bog lemming and harlequin duck, as well as hydrology and fisheries habitat, old growth (flammulated owl, boreal owl, fisher, pileated woodpecker and northern goshawk), and snag-dependent species (pileated, white-headed and black-backed woodpeckers).

On the Coeur d'Alene River Ranger District, agricultural lands are adjacent to the Coeur d'Alene Lake North and Hayden wildlife analysis areas. These habitat types can be inhabited by cowbirds. Brown-headed cowbirds pose a threat to neotropical migrant birds. The cowbird is a nest parasite which lays its eggs in the nests of over 250 species of birds (Friedmann and Kiff, 1985), the majority of which are neotropical migrants. The clearing of forests for agriculture and the introduction of livestock in the west have expanded the range of cowbirds (Robinson, Scott et al., 1992). There is some indication that cowbirds may currently be on the decline in Idaho (Ritter, pers. comm.). Cowbirds pose a threat to many hosts because of the cowbirds extraordinary productivity and the extent to which cowbird parasitism redues host productivity. Rothstein (1984) found cowbirds traveling up to 7 kilometers between feeding and nest searching sites. Timber harvest in forested landscapes provide the cowbird with opportunities for nest parasitism. Types of logging practices used may have little impact on cowbird parasitism levels and cowbirds are just as likely to parasitize nests in group selection cuts as in clearcuts (Robinson, et al., 1992).

To analyze the impact of this project on cowbird parasitism, agricultural lands and grazing allotments were mapped along with proposed units. These areas are considered to be potential feeding areas for cowbirds. It should be noted that grazing allotments within the forest generally lack the presence of large open meadows, and grazing is more likely to occur along grassy roadsides, along riparian corridors, and in small natural meadows. These may not be as attractive to the cowbird for feeding. Seasonal livestock concentration areas, such as trailheads used by hunters for their horses in the fall, were not mapped. The presence of livestock in these areas was considered to be of such a short-term nature that suitable cowbird feeding areas were not created. Proposed harvest units within 7 kilometers of agricultural pasture lands and grazing allotments were considered to be threatened by cowbird parasitism. All harvest units within th Hayden and Coeur d'Alene Lake North analysis areas could potentially be parasitized by cowbirds, resulting in a reduction of neotropical migrant birds. If trees in the proposed harvest units are allowed to die naturally, similar openings and opportunities for cowbird nest parasitism would be created. It is unknown to what extent neotropical populations would be affected under either scenario. To reduce effects to ground-nesting birds, timing restrictions would be implemented during burning activities to maintain potential next sites in similar habitat (please refer to the discussion of Features Common to All Alternatives in Chapter II).

Rationale for No Further Analysis: Because a detailed analysis has been conducted for other species that share similar habitats and based on the effects described above, species in this group are not analyzed further in this document.

Snags and dead down woody habitat. Historically, ecosystems in north Idaho were shaped by disturbance patterns that altered the size and distribution of various structures across the landscapes. Forest succession, wind damage, insects and disease, fire and other disturbances created snags in areas that ranged in size from individual trees to small patches or stands to entire drainages (1,000 acres or more). Consequently, snag densities varied across the landscape, from areas with low levels of snags to other areas with abundant snags.

Recent studies indicate that viable woodpecker populations occurred in areas with about four snags per acre (Bull et al. 1997). Managing for viable populations of snag dependent species does not require providing for snags on every acre in any subdrainage or across the landscape. Bull et al. (1997) recommends providing snags in every 5 to 25-acre stand to satisfy distribution needs.

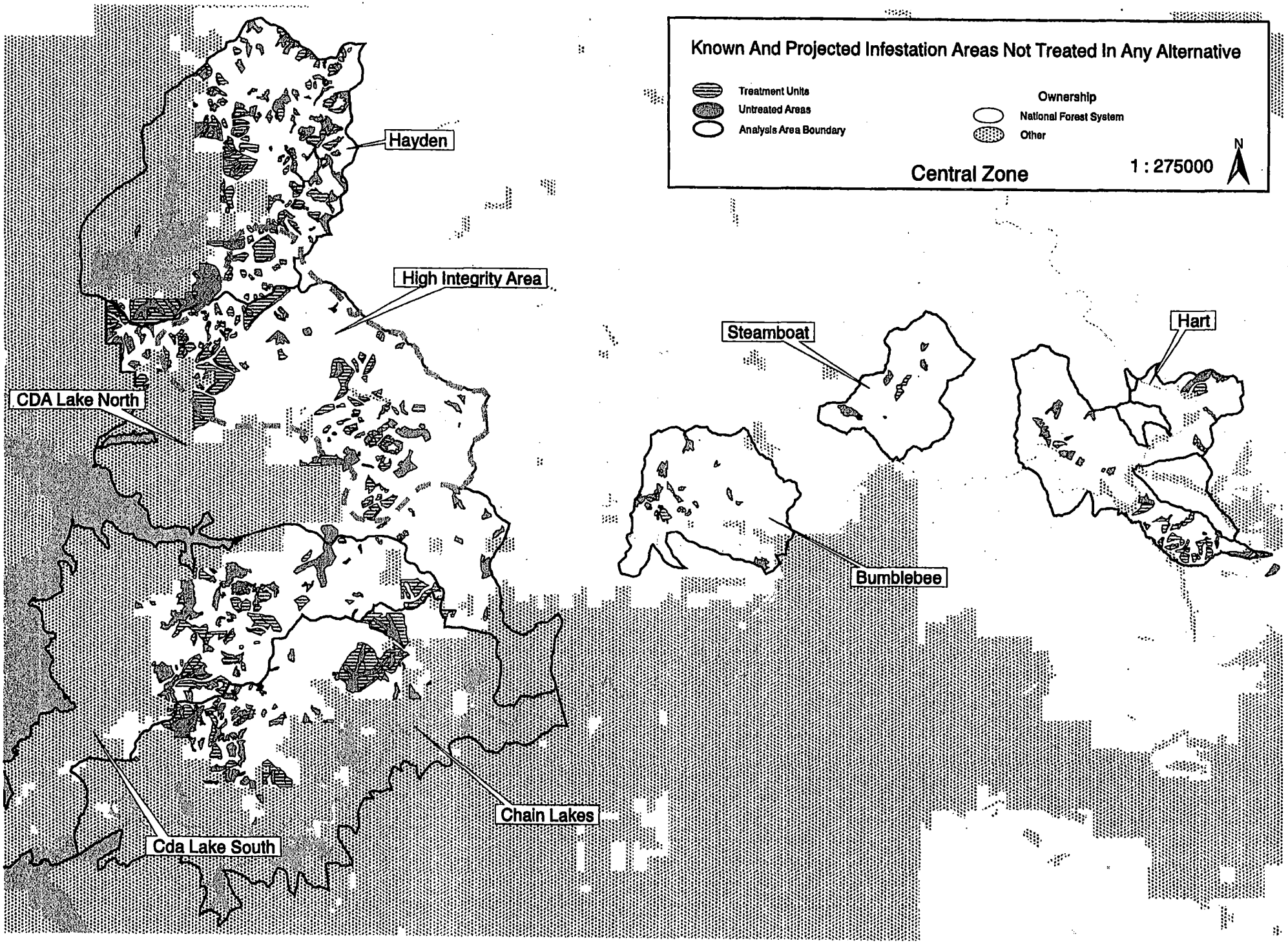
The present bark beetle epidemic has, is and will continue to kill live trees, thereby creating snags and areas of high snag densities. The scope of the bark beetle infestation is discussed elsewhere in this document. In all action alternatives some snags created by bark beetles would be harvested and lost as habitat for cavity

dependent species. However, the potential effects on snags and down wood is ameliorated by a number of factors.

Not all areas impacted by bark beetles would be treated (project file); and it is not the intent of this project to remove all pockets/patches of dead trees created by the Douglas-fir bark beetle outbreak. Concentrated pockets of snags would remain untreated and unaffected by any management across the landscape. Areas outside of proposed treatment areas are and would continue to provide snags in excess of numbers shown to support viable populations. Areas would be reserved from treatment within Inland Native Fish Strategy buffers. These areas along with untreated stands would contribute to snags and cavity habitat.

Design features of the project were devised to ensure the retention and selection of snags at a level and distribution which has been shown to support viable populations of species which use snags and logs (design features, Chap II). Snags and snag replacements would be retained in all treatment units at levels recommended by scientific literature based on recent studies. Snag retention objectives exceed Forest Plans standards and snag retention levels developed by Thomas et al. (1979). Snag retention objectives, including compensation levels are consistent with recent published data that suggests that populations of cavity nesters were viable in stands of ponderosa pine and mixed conifer forests that contained about four snags per acre (Bull et al. 1997).

The project would meet Forest Plan goals and objectives for cavity habitat, and Forest Plan standards would be met or exceeded in all alternatives.


Known And Projected Infestation Areas Not Treated In Any Alternative
Treatment Units
Untreated Areas
Analysis Area Boundary
Ownership
National Forest System
Other
Central Zone
1 : 275000
N
Hayden
High Integrity Area
CDA Lake North
Steamboat
Hart
Bumblebee
Chain Lakes
Cda Lake South

ENVIRONMENTAL CONSEQUENCES

Introduction

The analysis considered direct, indirect, and cumulative effects. Cumulative effects are defined as impacts to the environment which result from the incremental impact of an action when added to other past, present and reasonably foreseeable future actions regardless of what agency or person undertakes such actions. Cumulative impacts can also result from individually minor but collectively significant actions taking place over a period of time. The relative scope of the cumulative effects analysis has both a temporal and a spatial component. Refer to Appendix E for a list of foreseeable and ongoing projects.

It is the intent of this analysis that the information base reflect changes in habitat conditions (such as stand structure), resulting from past, present and reasonably foreseeable actions. Except where specifically mentioned, it is assumed that private lands did not provide habitat. Therefore, the analyses of species are a cumulative representation of these actions.

USDA Forest Service policy (Forest Service Manual 2670) requires a documented review or Biological Assessment of Forest Service programs or activities in sufficient detail to determine how an action may affect Threatened, Endangered, Proposed, or Sensitive species. Consultation with U.S. Fish & Wildlife Service is mandatory if the Biological Assessment concludes that a proposed action may have an effect on federally-listed species or habitat.

The Biological Assessment for Threatened, Endangered, and Proposed species is a "stand-alone" document. It and the letter of concurrence from the U.S. Fish and Wildlife Service can be found in the project files ("Wildlife"). The documentation of effects and rationale for conclusions for Sensitive species are consolidated into the main text of the Final EIS and project file (USDA Forest Service, 1995). The Sensitive Species and MIS Summary of Conclusion of Effects can be found at the end of the Coeur d'Alene River Ranger District Wildlife section in this document.

Cumulative Effects Analysis Areas

For each species analyzed in this chapter, the cumulative effects area has been determined based on the species' or guilds' relative home range size in relation to its available habitat, topographic features (watershed boundaries) which relate to how species move and utilize their home range, and boundaries that represent the furthest extent of effects. They do not necessarily correlate with the analysis area boundaries. Maps depicting wildlife habitat by species are in the Project Files ("Wildlife").

Determination of Effects Calls

Changes in habitat are combined with other effects (i.e. security) and displayed separately for past, present and reasonably foreseeable actions. The resulting conclusion and the magnitude of the effect is rated either no effect, minor, moderate, or high (applies to beneficial or adverse affect).

No effect = unmeasureable effect or compensating adverse and beneficial effects
Minor = individuals not likely affected
Moderate = individuals may be affected, but populations would not be affected
High = populations may be affected

Indicators for Selected Species

Based on habitat relationships, appropriate indicators of habitat with a potential to be impacted by the proposed action will be measured. Those indicators are displayed in the following table. Queries of the timber stand data base (TSMRS) were developed to identify capable and suitable habitat within each

wildlife analysis area. The changes in habitat for each relevant species will be disclosed and a discussion of the effects on species will be displayed. Potential effects on relevant species will be organized and displayed by wildlife analysis area.

Table III-90. Management indicators for analyzed species, Coeur d'Alene River Ranger District.

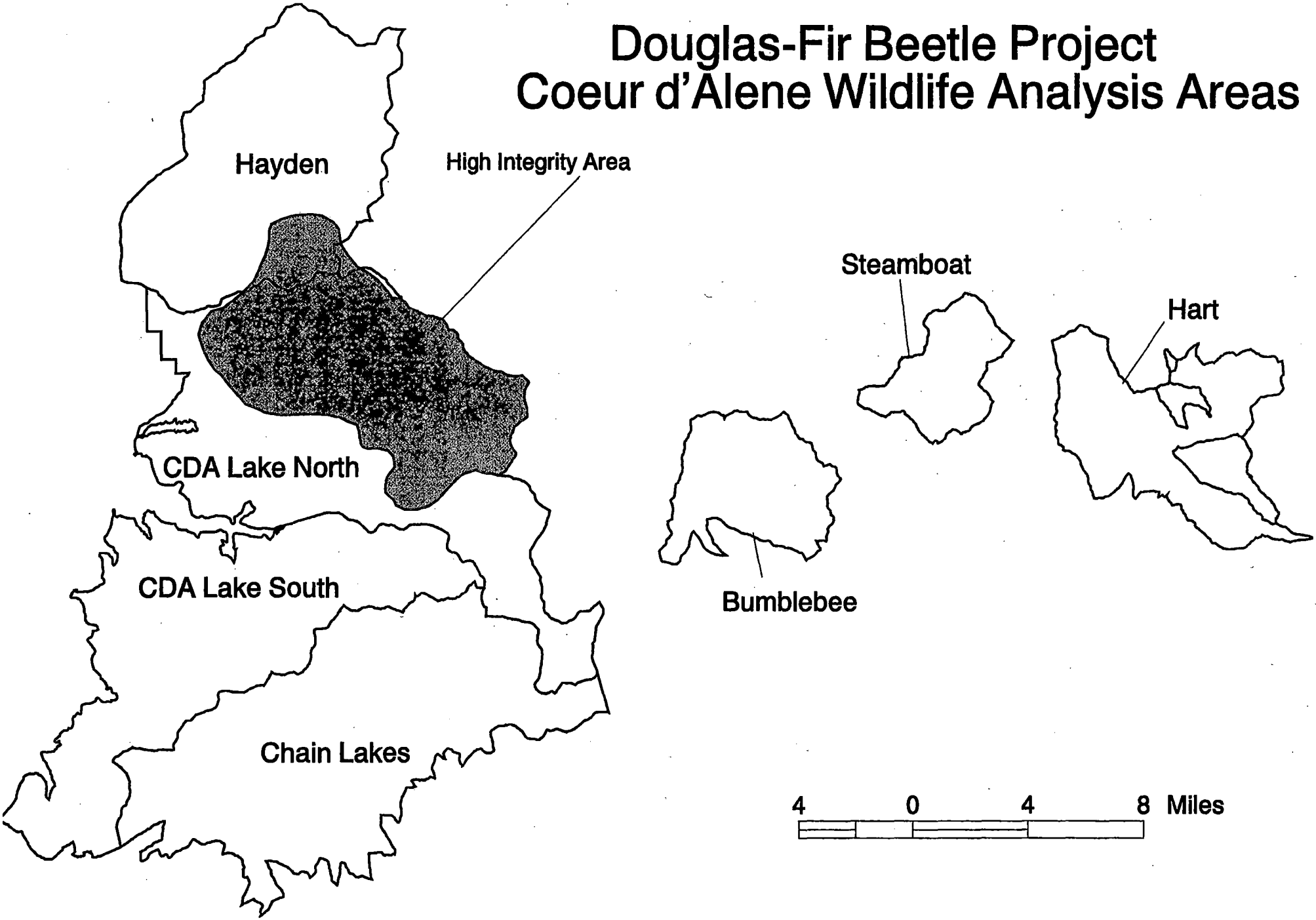
Species	Indicator
Threatened - Bald Eagle	• alteration of suitable nesting and winter roost habitat, changes in winter use patterns caused by disturbance
Proposed - Lynx	• changes to suitable habitat and security
Sensitive	
Coeur d'Alene salamander	• disturbance of microhabitat sites (e.g. rocky seeps), maintenance of water quality
Fisher	• alteration of suitable denning habitat and security
Flammulated owl and white-headed woodpecker	• changes to suitable habitat.
Northern goshawk	• alteration of suitable nesting habitat and disturbance.
Wolverine	• disturbance to dens and overall security
Management Indicator	
American marten	• alteration of suitable denning habitat and security
Elk	• changes to potential elk use (Elk Habitat Potential)

Cumulative Effects Analysis Areas

There are seven analysis areas:

- **Hayden** Analysis Area includes the Hayden watershed.
- **Coeur d' Alene Lake** Analysis Area covers over 60,000 acres, so the project was divided into two areas for the purpose of the wildlife cumulative effects analysis. Interstate 90 is a logical breaking point from a wildlife movement perspective. **Coeur d' Alene Lake North** includes the Fernan and Wolf Lodge watersheds. **Coeur d' Alene Lake South** includes South Fork Cedar Creek, Beauty Creek, Carlin Creek, and other Coeur d'Alene Lake watersheds.
- **Chain Lakes** Analysis Area includes the Chain Lakes watershed.
- **Steamboat** Analysis Area includes the Steamboat watershed.
- **Bumblebee** Analysis Area includes the Bumblebee watershed.
- **Hart** Analysis Area includes the Hart and Beaver watersheds.

Douglas-Fir Beetle Project
Coeur d'Alene Wildlife Analysis Areas



Methodology

This analysis is tiered to the following documents, which provide the primary direction and methods used to develop the analysis for potential effects on wildlife.

- *Integrated Scientific Assessment for Ecosystem Management in the Interior Columbia Basin*
- *Toward an Ecosystem Approach: An Assessment of the Coeur d'Alene River Basin*
- *IPNF Forest Plan*
- *Available Conservation Assessments and Strategies for wildlife species*
- *Additional scientific literature as appropriate*

The analysis is done at different levels of intensity (for example, from course filter to medium filter to fine filter) as appropriate to address the issues and concerns.

Some elements of wildlife habitat require detailed analysis to determine potential effects on wildlife species. Other elements may either not be impacted, impacted at a level which does not influence use/occurrence or the decision to be made, or can be adequately addressed through design of the project. These elements do not necessarily require in depth analysis.

The level of analysis is dependent on a number of variables including but not limited to: the existing condition, the cause and effect relationship, the magnitude or intensity of effects, the contrast in effects between alternatives, the risks to resources, and the information necessary for an informed decision. The analysis is commensurate with the importance of the impact (CEQ 1502.15), the risk associated with the project, the species involved, and the level of knowledge already in hand (USDA Forest Service, 1992).

Direct, Indirect and Cumulative Effects at the Analysis Area Scale

Threatened, Endangered and Proposed Species

BALD EAGLE

Hayden Analysis Area

Hayden Lake is within the analysis area. There is approximately 1 mile of Forest Service Land that is adjacent to the shoreline of Hayden Lake. Approximately one-half to one mile of private land exists between the lake and the majority of National Forest land. Up to five bald eagles have been sighted along the lake during annual winter surveys. A roosting location is not known (Sturtz 1998). An active nest site occurs next to the lake off of Forest Service property (Hayden, personal communication, 1998). The nest site is adjacent to a well-traveled road and near private homes. Disturbance on the lake is quite heavy and frequent, including motor boats, jet skis, and float planes. During the nesting period, a float plane flies near the nest daily. Past construction of private homes and increased human disturbance has resulted in moderate loss of habitat and security for bald eagles on Hayden Lake. The nest site is adjacent to a road with moderate levels of disturbance below the nest.

Alternatives A and G

Direct and Indirect Effects: Under Alternative A, there would be a minor reduction in canopy closure due to the beetle-related tree mortality. These stands would become more open and less sheltered from the wind, and would no longer be optimal for the bald eagle as a roost site. There would be no increased disturbance to the nest site.

Cumulative effects: There are past and ongoing moderate disturbances from private land, and moderate loss of roosting and nesting habitat from private actions. Due to the canopy closure loss under Alternative A, there may be a minor loss of potential roost sites. Overall, cumulative effects would be moderate.

Alternatives B, C, E, and F

Direct and Indirect Effects: Except for a unit that is within one mile of the lakeshore, all proposed units would be selectively logged and roosting habitat would be maintained based on features incorporated for snag and live tree replacement. Should roost trees be found during implementation, they would be protected to avoid adverse effects (please refer to the alternative features related to wildlife, in Chapter II). In all selectively-harvested stands, canopy closure loss would not differ from what would occur under Alternative A. Adequate alternate roosting habitat exists on National Forest System lands along the face areas of Hayden Lake that are not experiencing Douglas-fir beetle activity. Unit 322 is a regeneration unit proposed for conventional logging and is approximately one mile from the nest. Because this unit is not located within a path for foraging, and the disturbance is immeasurable compared to the existing disturbance around the lake, activity in this unit would not affect the nest site. Units 32, 35, and 37 are all within one and one-half miles from the nest and are proposed for helicopter logging. None of the units are located within the primary use area for the nesting bald eagle (one-quarter mile from nest site) (Montana Bald Eagle Working Group, 1991).

Helicopters over the nest could result in high disturbance effects to the nesting bald eagles without mitigation (Stalmaster, Kaiser 1997).

Cumulative Effects: There are past and ongoing moderate disturbances from private land, and moderate loss of roosting and nesting habitat from private actions. Proposed project activities would result in minor reductions of potential roosting habitat and a minor short-term increase in disturbance to the nest site, provided mitigation measures for avoiding disturbance are implemented. Roost sites are not limited on National Forest Land. Overall, cumulative effects would be moderate.

Alternative D

Direct and Indirect Effects: Regeneration harvests in Units 35, 39, 43, 44, and 200 may slightly reduce future winter roosting habitat beyond the effects of other harvest alternatives. However, due to the loss of canopy closure caused by the beetle-related tree mortality, these stands would not be expected to maintain optimal canopy closure for roost site protection. Compared to the effects of the beetle-related canopy loss, the additional effects of harvest activity would be minor. The majority of harvested acres (Units 38, 40 and 303) would be selectively logged, and live trees would not be harvested. Within these units, roosting habitat would be maintained based on design features and mitigation incorporated for snag and live tree replacement. Should roost trees be found during implementation, they would be protected, as stated in the alternative design features and mitigation related to wildlife, in Chapter II.

Cumulative Effects: Cumulative effects would be similar to those under Alternatives B, C, E, and F, described above.

Coeur d' Alene Lake North Analysis Area

Suitable nesting habitat and potential roosting habitat occurs adjacent to Fernan Lake. An active nest was discovered in 1998. There is no National Forest land adjacent to the lake. Disturbance to the nest site due to recreational use on the lake would continue to have a moderate effect on the nesting bald eagle. Private homes and a road along the lake would continue to cause a minor to moderate loss of potential winter roost and nest sites. Because the lake usually freezes, Fernan Lake is not a primary wintering site for bald eagles.

Alternatives A and G

Direct and Indirect Effects: There would be no effect to nesting or roosting, nor any disturbance to the nest.

Cumulative Effects: There has been a minor loss of potential winter roost sites, and a moderate loss of potential nest sites. There would be no additional cumulative effects Under Alternatives A and G. Cumulative effects would be considered moderate based on past and ongoing activities on private land.

Alternatives B, C, D, E, and F

Direct and Indirect Effects: Helicopter activity in units approximately two miles away may moderately increase disturbance of the nest site if it is active (Stalmaster, Kaiser 1997). There would be no loss of potential nesting or roosting habitat. Implementing features to avoid the helicopter flying over the active nest site would reduce effects so that they would be minor. Please refer to Chapter II for a discussion of mitigation measures.

Cumulative Effects: Past actions on private land have resulted in a minor loss to potential winter roost sites and moderate loss of potential nest sites. Disturbance to the nest site is moderate. Alternatives B, C, D, and E would not result in additional effects to winter roost sites and nest sites. Cumulatively, there would be minor additional disturbance effects, provided that the features for this analysis area for bald eagles would be implemented. Cumulative effects would be considered moderate.

Coeur d' Alene Lake South Analysis Area

Each winter, approximately 70 bald eagles migrate to Coeur d'Alene Lake and feed on spawning salmon from November to approximately the first of February, with peak numbers in late December. The bald eagles attract thousands of visitors to the area to watch the eagles at Wolf Lodge and Beauty Bays. National Forest land surrounding the lake provides perching habitat and potential night-roosting habitat. This potential roosting habitat exists adjacent to the section of land currently used as the winter roost site. The general location of the roost site is known (personal communication S. Robinson, 1998). Roost trees can be live or dead, large trees. Past and ongoing private development along the lake has moderately reduced bald eagle nesting and roosting habitat.

Alternative A, F and G

Direct and Indirect Effects: A loss in canopy closure due to beetle activity may reduce the potential for roosting habitat. There would be no activities in the vicinity of Wolf Lodge and Beauty Bays. There would be no effects from project activities.

Cumulative Effects: There would be a moderate loss of bald eagle nesting and roosting habitat due to private development along the lake. This project would have no effect to bald eagle habitat. Due to Douglas-fir mortality, there may be minor effects, such as loss of potential roost sites. Cumulatively, effects would be considered moderate.

Alternatives B, C, D, and E

Direct and Indirect Effects: A loss in canopy closure due to beetle activity may reduce the potential for roosting habitat. There would be a minor reduction of perching habitat due to harvesting in Units 137 and 208. Canopy closure, snags and green tree replacements would be maintained within units through implementation of snag-marking guidelines. Additional perch sites exist along this portion of the lake. Alternative development assured that there would be no effects to the communal roost site. By restricting helicopter logging when the wintering bald eagles are present, there would be no effect to winter roost sites and minimal effects to perching habitat.

Cumulative Effects: There would be a moderate loss of bald eagle nesting and roosting habitat due to private development along the lake. There may be minor effects to loss of perch sites due to activities under the action alternatives, and minor loss of potential roost sites due to Douglas-fir beetle activity. Cumulatively, effects would be considered moderate.

Chain Lakes Analysis Area

Along the Chain Lakes there are two bald eagle nest sites. Neither occur on National Forest System lands. The National Forest lands in the Chain Lakes area are not near any body of water large enough to provide for the bald eagle. Another bald eagle nest territory is just east of the analysis area. Ongoing activity on federal land would cause minor disturbance, and the removal of trees may affect but would be not likely adversely affect the bald eagle.

Direct and Indirect Effects: Because this project does not affect bald eagle habitat, there would be no effects to the bald eagle.

Cumulative Effects: Past alterations on private lands have moderately reduced habitat for the bald eagle. Any effects that occur to bald eagle nest sites as a result of activities on private lands would be beyond the influence of National Forest land. The proposed project activities would not affect bald eagle habitat. Cumulative effects would be considered moderate.

Steamboat Analysis Area

No nesting territories are located within or in close proximity to the Steamboat Analysis Area. There are no known roosts or likely potential roost sites located in the analysis area, although migrating or wintering bald eagles may occasionally use the area. The North Fork of the Coeur d'Alene River runs along the southern end of the Analysis Area. Bald eagles use the river during the winter months; however, it does not meet the requirements of potential bald eagle nesting habitat (Montana Bald Eagle Working Group, 1991). The highway along the Coeur d'Alene river reduces winter roost habitat and cause a moderate increase in disturbances. Roads along the Coeur d'Alene River have also altered roosting habitat in the draws.

Effects Common to All Alternatives

Direct and Indirect Effects: None of the alternatives would affect potential bald eagle habitat.

Cumulative Effects: Past roading has severely reduced habitat for the bald eagle. Current disturbance from the highway has a moderate effect on wintering roost sites. The proposed project activities would not add cumulative effects to the bald eagle. Overall, cumulative effects would be considered moderate.

Bumblebee Analysis Area

No nesting territories are located within or in close proximity to the Bumblebee Analysis Area. Habitat is provided along the Little North Fork of the Coeur d'Alene River for the bald eagle, however, there are no sightings to support that bald eagles now use the area. The river does not meet the requirements of potential bald eagle nesting habitat (Montana Bald Eagle Working Group, 1991). Historically, it is likely that eagles foraged and possibly nested along the Little North Fork. Occasional migrating or wintering bald eagles may use the area. There are no known roosts or likely potential roost sites located in the Bumblebee Analysis Area. Roading along the river has altered riparian habitat and reduced perch and roost trees for the bald eagle. Due to existing roads and human disturbance, the area is not providing any important habitat for the bald eagles which may occasionally use the area.

Effects Common to All Action Alternatives

Direct and Indirect: None of the alternatives would affect roosting habitat.

Cumulative Effects: Past roading has severely reduced roosting habitat for the bald eagle. Current winter disturbance moderately reduces potential winter roost sites. The proposed project activities would not alter the habitat or result in disturbance to bald eagles. Because there are no effects to nesting habitat, overall, cumulative effects would be considered moderate.

Hart Analysis Area

The North Fork of the Coeur d'Alene River runs through the Hart Analysis Area. Bald eagles have been reported along North Fork of the Coeur d'Alene during the winter months. There are no known roost sites. Private and federal roads along the Coeur d'Alene River have moderately altered roosting habitat in the draws. Currently, disturbance from motorized vehicles moderately reduces potential winter roost sites. No nesting territories are located within or in close proximity to the Hart Analysis Area. Due to the size of the Coeur d' Alene River in this area, it is unlikely that the river supports enough prey base for nesting bald eagles. Even though the Hart Analysis Area is within close proximity and topographic line-of-sight of the Coeur d'Alene River, it does not meet the requirements of potential bald eagle nesting habitat as outlined in the "Habitat Management Guide for Bald Eagles in Northwestern Montana" (Montana Bald Eagle Working Group, 1991). Habitat is less than one-quarter mile from an open road and related human activity, with frequent human activity between potential nest sites and the associated water body. Potential roosting habitat is not limiting. The proposed project would not alter roosting or nesting habitat or add to the existing disturbance.

Direct and Indirect Effects: There would be no effects to potential nesting or roosting habitat, and no increase in disturbance under any of the proposed alternatives.

Cumulative effects: Past loss of habitat has had a moderate effect on bald eagles. There would be no effects to bald eagles under any of the proposed alternatives. Cumulatively, effects would be considered moderate.

LYNX

Supplemental information on the methodology and data used for determining effects to habitat and security is located within the project files ("Wildlife"). Changes in the habitat model queries between publication of the Draft EIS and preparation of the Final EIS resulted in corrections to the identified acres of habitat. Changes occurred to lynx foraging, which was found to be in error during the draft. For example, consultation with the U.S. Fish and Wildlife Service resulted in omitting a slope requirement in the final habitat query, which added acres identified as habitat. In addition, it was determined that the analysis of effects to lynx habitat would be more accurate to include only those areas located at or above 4,000 feet in elevation.

Table III-91 displays the existing lynx habitat and the amount of habitat that would remain under each alternative. Capable lynx habitat has fixed attributes (such as habitat type and elevation) that enable the stands to meet lynx habitat requirements currently or in the future. Currently in the wildlife analysis areas, much of the capable habitat serves the lynx as travel habitat largely because it is not yet old enough to be denning habitat. Some capable habitat in the analyses area does currently qualify as suitable denning and foraging habit. Because the suitable denning and foraging are the most important habitat components for lynx, the analysis focuses on these habitat attributes.

"Travel" habitat is habitat over 4,000 feet in elevation that a lynx may travel through. Travel habitat does not include lynx denning or foraging habitat, or unsuitable habitat. Within the analysis areas, the acres of unsuitable habitat is comprised of younger-aged stands, equal to or less than 10 years old. The acres of

unsuitable habitat displayed in the table do not include areas such as lakes or rocky areas, because these attributes are not present within the analysis areas. None of the areas have enough acres to provide a home range for a lynx; it is unlikely a lynx would reside in the analysis areas. Maintenance of the habitat that is present is necessary for future establishment of Lynx Area Units throughout the district.

Effects Common to All Alternatives

Factors used to define security for lynx included open road densities, open system roads located on ridges (which provide access into lynx habitat), and disturbance from uses on open roads as well as disturbance from recreational activities. Access into lynx habitat correlates to the risk of lynx mortality through incidental trapping. Based on these factors, security would range from moderate to high, depending on the analysis area.

Effects Common to All Action Alternatives

Specific design features such as downed woody debris and snag retention features, as well as access management provisions, would continue to provide for lynx habitat needs, and would not measurably decrease the availability of denning habitat beyond the existing condition. There would be no increase in open road density, with some minor opportunities in lynx habitat for reduced open road densities. There would be no regeneration harvests in lynx habitat.

Effects Common to Alternatives B, C, D, E, and F

Effects to security based on past activity would be considered moderate to high. Specific alternative features, such as snag retention and access management provisions, would provide for lynx denning needs and would not decrease the availability of denning habitat beyond the existing condition. Please refer to the alternative design features and mitigation related to wildlife in Chapter II.

Table III-91. Changes in Acres and Percent (%) Suitable Lynx Habitat, by Alternative.

Analysis Area	Existing		Alt. A		Alt. B		Alt. C		Alt. D		Alt. E		Alt. F		Alt. G	
Hayden	*There are 4,496 acres of lynx habitat above 4,000 feet in this analysis area; this is approximately 10% of the entire analysis area.*															
Capable Habitat	4,141		4,141		4,141		4,141		4,141		4,141		4,141		4,141	
Suitable Foraging	178	4%	178	4%	178	4%	178	4%	178	4%	178	4%	178	4%	178	4%
Suitable Denning	391	9%	376	9%	374	9%	374	9%	374	9%	374	9%	374	9%	376	9%
Temp Non-suitable	28	0.6%	28	0.6%	28	0.6%	28	0.6%	28	0.6%	28	0.6%	28	0.6%	28	0.6%
CDA Lake North	*There are 8,357 acres of lynx habitat above 4,000 feet in this analysis area; this is approximately 12% of the entire analysis area.*															
Capable Habitat	8,529		8,529		8,529		8,529		8,529		8,529		8,529		8,529	
Suitable Foraging	1,573	18%	1,573	18%	1,573	18%	1,573	18%	1,573	18%	1,573	18%	1,573	18%	1,573	18%
Suitable Denning	2,192	26%	2,167	25%	2,165	25%	2,165	25%	2,165	25%	2,165	25%	2,124	25%	2,167	25%
Temp Non-suitable	473	6%	473	6%	473	6%	473	6%	473	6%	473	6%	471	6%	473	6%
CDA Lake South	*There are 889 acres of lynx habitat above 4,000 feet in this analysis area; this is approximately 2% of the entire analysis area.*															
Capable Habitat	833		833		833		833		833		833		833		833	
Suitable Foraging	107	13%	105	13%	105	13%	105	13%	105	13%	105	13%	105	13%	105	13%
Suitable Denning	178	21%	166	20%	166	20%	166	20%	166	20%	166	20%	166	20%	166	20%
Temp Non-suitable	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Chain of Lakes	*There are 134 acres of lynx habitat above 4,000 feet in this analysis area; this is approximately 0.2% of the entire analysis area.*															
Capable Habitat	41		41		41		41		41		41		41		41	
Suitable Foraging	3	7%	3	7%	3	7%	3	7%	3	7%	3	7%	3	7%	3	7%
Suitable Denning	15	37%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Temp Non-suitable	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Bumblebee	*There are 1,175 acres of lynx habitat above 4,000 feet in this analysis area; this is approximately 8% of the entire analysis area.*															
Capable Habitat	1,057		1,057		1,057		1,057		1,057		1,057		1,057		1,057	
Suitable Foraging	205	19%	205	19%	205	19%	205	19%	205	19%	205	19%	205	19%	205	19%
Suitable Denning	330	31%	292	28%	292	28%	292	28%	292	28%	292	28%	292	28%	292	28%
Temp Non-suitable	102	10%	78	7%	78	7%	78	7%	78	7%	78	7%	78	7%	78	7%
Steamboat	*There are 2,188 acres of lynx habitat above 4,000 feet in this analysis area; this is approximately 25% of the entire analysis area.*															
Capable Habitat	1,478		1,478		1,478		1,478		1,478		1,478		1,478		1,478	
Suitable Foraging	241	16%	241	16%	241	16%	241	16%	241	16%	241	16%	241	16%	241	16%
Suitable Denning	352	24%	352	24%	352	24%	352	24%	352	24%	352	24%	352	24%	352	24%
Non Suitable	223	15%	223	15%	223	15%	223	15%	223	15%	223	15%	223	15%	223	15%
Hart	*There are 1,170 acres of lynx habitat above 4,000 feet in this analysis area; this is approximately 5% of the entire analysis area.*															
Capable Habitat	1,050		1,050		1,050		1,050		1,050		1,050		1,050		1,050	
Suitable foraging	280	27%	280	27%	280	27%	280	27%	280	27%	280	27%	280	27%	280	27%
Suitable Denning	63	6%	63	6%	63	6%	63	6%	63	6%	63	6%	63	6%	63	6%
Nonsuitable	436	42%	436	42%	436	42%	436	42%	436	42%	436	42%	436	42%	436	42%
Total																
Capable Habitat	17,129		17,129		17,129		17,129		17,129		17,129		17,129		17,129	
Suitable foraging	2,587	15%	2,585	15%	2,585	15%	2,585	15%	2,585	15%	2,585	15%	2,585	15%	2,585	15%
Suitable Denning	3,521	20.6%	3,416	19.9%	3,416	19.9%	3,416	19.9%	3,416	19.9%	3,416	19.9%	3,416	19.9%	3,416	19.9%
Temp Non-suitable	603	3.5%	579	3.4%	579	3.4%	579	3.4%	579	3.4%	579	3.4%	579	3.4%	579	3.4%
Nonsuitable	659	4%	659	4%	659	4%	659	4%	659	4%	659	4%	659	4%	659	4%

Hayden Analysis Area

The majority of the project area is below 4,000 feet. Approximately 30% of the analysis area is on private land and/or in urban areas, below 4,000 feet in elevation, and is not providing lynx habitat. Because there are not enough acres above 4,000 feet to provide for a lynx home range, the Hayden analysis area most likely serves as travel habitat. There was an unconfirmed lynx sighting in the analysis area in 1997. The area receives heavy motorized use. Disturbance has caused a moderate loss of security. Past and ongoing activities have moderately reduced suitable habitat and have had moderate effects on security. There are currently approximately 4,141 acres of capable habitat, of which 391 is considered suitable denning habitat and 178 acres are suitable foraging habitat. The Spades Mountain Trail is a foreseeable project that does not affect lynx, since it occurs on a small patch of isolated capable habitat surrounded by areas less then 4,000 feet in elevation.

Direct and Indirect Effects

Alternative A: The Douglas-fir beetle outbreak has caused tree mortality and a reduction in overstory, resulting in a minor loss of suitable denning habitat (15 acres). There would be no effects to suitable forage habitat. Although there would be a reduction in open road densities as a result of foreseeable projects, the reduction would be so slight as to be immeasurable. In areas where the beetle activity has been less severe and the overstory canopy persists, the additional mortality within the stand can benefit lynx by increasing the amount of downed woody material or complex structure of the forest floor. Both the change in denning habitat and immeasurable reduction in security would have an immeasurable effect on the lynx.

Alternatives B, C, D, and E: Management activities would not result in measurable changes in the amount of denning habitat beyond the reduction that has occurred or is anticipated to occur from the Douglas-fir beetle mortality. Harvest in two units within lynx denning habitat would be implemented in a manner that would provide the downed woody material and future downed materials needed by lynx. There would be no effects to suitable foraging or unsuitable habitat. Minor, short term (approximately 1 - 5 years), increased disturbance due to the proposed project may cause lynx to avoid the analysis area during project implementation. Minor reductions in open road densities occurring under this proposed project and road closure opportunities that may occur would not measurably affect the lynx over the existing condition. Ecosystem burning opportunities would not affect the lynx, as they occur below 4,000 feet.

Alternative F: Under Alternative F, underburning in Unit 34 would reduce the canopy closure by about 5% more than what would occur under Alternatives B, C, D, and E. Approximately two acres would be affected, which would have such a slight effect to lynx as to be immeasurable. Under Alternative F, the extension of the fuelbreak onto a secure ridge would have a minor long-term affect to lynx, but would not jeopardize the lynx. The majority of the fuelbreak would be located in areas with little security, due to adjacent open roads.

Alternative G: Ecosystem burning would not occur in lynx suitable habitat, and would have no affect to lynx. Watershed restoration projects may cause a short-term increase in disturbance (less than 1 year) in relatively secure habitat, resulting in a minor affect to lynx. Design features that conceal openings created when watershed restoration work removes existing brush on the road would negate possible long-term security effects to lynx.

Cumulative Effects

Past activities have moderately reduced security and suitable habitat. Under all alternatives, there would be minor effects to suitable denning habitat as a result of Douglas-fir mortality. Under Alternative A, there would be no disturbance to lynx. Under all action alternatives except Alternative F, there would be minor,

short-term disturbance to lynx. Under Alternative F, effects would still be minor, but would be longer term. Overall, the cumulative effects would be considered moderate for all action alternatives.

Coeur d'Alene Lake North Analysis Area

Over 30% of the analysis area is privately-owned land below 4,000 feet, and is not considered lynx habitat. Approximately 44% of the lynx habitat is currently suitable for denning or foraging. This analysis area has the most lynx habitat, but still is lacking in the amount needed to qualify for a home range (Ruggiero et al, 1994). Although open road densities are less than 1.5 miles per square mile, security loss is moderate due to recreational activity, such as snowmobile use and an open system road along the ridge. Past and currently ongoing projects have resulted in a minor to moderate reduction in habitat and security.

Effects Common to All Alternatives

Direct and Indirect Effects: There would be no effects to suitable foraging or unsuitable habitat.

Cumulative Effects: Due to past and ongoing activities, there has been a minor increase in unsuitable habitat, and a minor loss of suitable foraging. Foreseeable activities would cause a minor increase in unsuitable habitat. There are no anticipated effects to foraging habitat under any alternative. Cumulatively, effects to lynx would be considered minor.

Effects Common to All Action Alternatives

Direct and Indirect Effects: Minor increases in disturbance may cause lynx to avoid the project area during the short term (1 to 5 years). Opportunities for road closures in lynx habitat would result in a minor increase in security for the lynx.

Cumulative effects: Due to past and ongoing activities, there has been a moderate reduction in security. Foreseeable activities would have minor effects on security. Activities under the action alternatives would have minor effects over the short term. Overall, effects to security would remain moderate.

Alternatives A, B, C, D, E, and G

Direct and Indirect Effects: Loss of canopy closure due to beetle-related tree mortality would cause a loss of 25 acres of denning habitat. Management activities would not result in measurable effects in the amount of denning habitat, beyond the reduction that has occurred or is anticipated to occur from the Douglas-fir beetle mortality. Effects to suitable denning habitat would be minor under these alternatives. Opportunities for ecosystem burning under Alternative D would not affect lynx.

Cumulative Effects: Effects of past projects on denning habitat have been minor. Changes caused by the Douglas-fir beetle activity would have a minor effect to denning habitat. Foreseeable activities will cause an additional minor loss of denning habitat. Cumulatively, effects to lynx would be minor under these alternatives.

Alternative F

Direct, Indirect and Cumulative Effects: Underburning in selectively harvested stands would result in an additional loss of canopy closure greater than 5% beyond what would occur as a result of the beetle infestation or harvest activities. It is difficult to predict whether or not these stands would be utilized as denning habitat. Effects would remain minor, and would not jeopardize the lynx. Underburning outside of harvest units would not effect lynx since there would be no additional canopy closure loss related to beetle activity in those stands. There would be approximately a 10% loss of canopy closure due to trees partially

killed by fire in the underburned units. Stands would continue to maintain canopy closure for lynx denning. Cumulative effects would be similar to Alternatives A, B, C, D, E, and G.

Coeur d' Alene Lake South Analysis Area

The majority of the project area is at a lower elevation than normally used by lynx. There have been no known lynx sightings within the analysis area. There are only 889 acres above 4,000 feet in this wildlife analysis area. These acres are scattered within the area and are not connected to any ridge system. Coordination with the U.S. Fish and Wildlife Service indicated that this wildlife analysis area does not provide enough habitat to support lynx, and it is highly unlikely this area would be used by lynx, even for travel. Therefore, any changes to small patches identified as suitable lynx habitat would not detract from the analysis area or affect lynx.

Direct and Indirect Effects: Based on the lack of habitat for the lynx and since there have been no past sightings of lynx within the area, it is unlikely that any alternative would alter habitat or impact the lynx.

Cumulative Effects: Due to the low suitability of habitat in the analysis area, there would be no cumulative effects to the lynx.

Chain Lakes Analysis Area

Only 135 acres of this wildlife analysis area are above 4,000 feet in elevation. There are no recorded lynx sightings within this analysis area. Because the area does not provide for lynx habitat, it is highly unlikely that lynx would use this area.

Direct and Indirect Effects: Based on the lack of habitat for the lynx and since there have been no past sightings of lynx within the area, it is unlikely that any alternative would impact the lynx.

Cumulative Effects: Due to the low suitability of the habitat in the analysis area, there would be no cumulative effects to the lynx.

Steamboat Analysis Area

The Steamboat Analysis Area provides some of the best lynx habitat on the Coeur d'Alene River Ranger District. Grizzly Ridge provides both denning and forage habitat, although an open road currently reduces the quality of some of this habitat.

Direct and Indirect Effects: There would be no effect from the beetle infestation or management activities within lynx habitat under any alternative, because there is no beetle activity occurring in the lynx habitat and there are no activities proposed in the lynx habitat.

Cumulative Effects: Past activities and roading have resulted in a minor to moderate reduction of lynx suitable habitat, and a high degree of security loss. Proposed project activities would not contribute to reduced security in lynx habitat or affect suitable habitat. Based on past activities, there would be moderate cumulative effects to suitable lynx habitat and high cumulative effects to lynx security.

Bumblebee Analysis Area

Less than 2,000 acres is above 4,000 feet and is unlikely to provide habitat for a lynx to reside. The analysis area may provide travel habitat for the lynx, as it is part of a ridge system extending northward.

Direct and Indirect Effects: The Douglas-fir beetle outbreak has caused tree mortality and subsequent reduction in overstory, resulting in an additional minor loss (3%) of suitable denning habitat. There would be no management activities in lynx habitat under any of the proposed alternatives. There are no effects to suitable foraging habitat due to the Douglas-fir beetle outbreak. There would be no effects to security beyond what would occur as a result of the beetle infestation.

Cumulative Effects: Past activity has resulted in a moderate loss of suitable habitat and security. Under Alternative A, there may be additional minor effects to denning habitat as a result of beetle activity. Cumulatively, there would be no additional effect to lynx habitat or security under the action alternatives. Cumulative effects to security and suitable habitat would be moderate based on past activities and the effects of the beetle infestation.

Hart Analysis Area

Roads on ridges moderately decrease security for lynx. The majority of the project area is at a lower elevation (less than 4,000 feet) than is primarily used by lynx (Weaver, pers. comm. 1998). There was an unconfirmed sighting of lynx adjacent to the analysis area in 1984, and unconfirmed lynx sign found in 1994 (Stock pers. comm 1999). The project area could serve as travel habitat for lynx. Due to the low amounts of denning and foraging habitat and hare habitat, it is unlikely that lynx reside in the Hart Analysis Area.

Effects Common to All Alternatives

Direct and Indirect Effects: In the Hart Analysis Area, canopy closure would not be reduced to the extent that stands would no longer serve as lynx habitat, either due to beetle-related tree mortality or due to harvest proposed under the action alternatives. An ongoing timber sale would cause a minor to moderate disturbance over the short term.

Cumulative Effects: Past activities have had moderate effects to lynx denning habitat. There would be no effect on suitable lynx habitat under any alternative. Cumulatively, effects would be considered moderate.

Effects Common to Alternatives B, C, D, E, and F

Increased disturbance through a stand of late successional hare habitat as a result of road access may have minor, short-term effects to individual lynx in the remote case a lynx may be hunting there. This stand of forage habitat is not adjacent to any lynx denning habitat. Obliteration of this same road in lynx habitat would slightly increase security for lynx for the long term.

Cumulative Effects: Based on past and ongoing activities, cumulative effects to security would be moderate. Due to a short-term decrease in security during project activity, and the post-sale obliteration of a road that would benefit lynx security, disturbance effects would remain moderate.

Opportunities for watershed restoration may increase disturbance and avoidance of the area by lynx for approximately one season during project implementation. This effect would be minor and short term.

Alternative G

Direct and Indirect Effects: Watershed restoration work scheduled in lynx habitat would result in short-term disturbances that may cause the lynx to avoid the analysis area over the short term. Because this road is currently impassable, and would remain so, this work would neither benefit or harm lynx over the long term.

Cumulative Effects: Due to past activities, there has been a minor to moderate decrease in security. There would be no effects to suitable habitat as a result of activities proposed under Alternative G. There would be a minor, short-term decrease in security as a result of disturbance caused by the activities. After the season,

the project would not affect the lynx. Cumulative effects would be moderate based on past activities and the minor increase in disturbance.

Sensitive Species

A summary of the conclusions of effects and viability determinations can be found at the end of the "Wildlife" Environmental Consequences discussion for the Coeur d'Alene River Ranger District.

COEUR D'ALENE SALAMANDER

Effects Common to All Alternatives

Cumulative Effects: On a landscape level, under all alternatives and in all analysis areas, there would be no additional effect on the timing, magnitude and duration of stream flows (please refer to the Coeur d'Alene River Ranger District "Watershed" discussions in this chapter). Based on the watershed analysis of effects on stream flows, there would be no anticipated change in watershed functions that would adversely affect Coeur d'Alene salamanders.

Effects Common to All Action Alternatives

Direct and Indirect Effects: No known Coeur d'Alene salamander site would be directly impacted by any vegetative management activity. A minimum protection zone of 100 feet would be maintained around all known Coeur d'Alene salamander sites and any sites found prior to implementation. Design features and mitigation (Chapter II) would be implemented to avoid or minimize any potential impacts from aquatic restoration activities on known sites. Under all action alternatives, implementation of Inland Native Fish Strategy buffers would avoid impacts to streamside and waterfall habitat for the Coeur d'Alene Salamander. Aquatic restoration work (such as culvert replacement or removal) can both directly and indirectly impact salamander habitat. However, restoration activity associated with roads and stream crossings would occur adjacent to habitat (if it were present) previously disturbed during road construction; and removal of culverts would be a minor impact compared to past disturbance. The risk or likelihood of any impact on salamanders would be low and the consequences of additional effects, if any, would be minor. Over the long term, restoration would trend stream conditions toward a historic, healthy condition and would result in a long-term improvement of Coeur d'Alene salamander habitat.

Cumulative Effects: The effects from past management activity have resulted in minor to moderate effects on habitat for this species. However, based on the low risk or potential for direct and indirect effects on stream flows, cumulative effects would remain minor to moderate under any action alternative.

Hayden Analysis Area

There are no known populations of Coeur d'Alene salamanders in the Hayden area. Potential habitat may exist in creeks and in abandoned mines.

Direct, Indirect and Cumulative Effects: The potential effects would be similar to those described under Effects Common to All Alternatives and Effects Common to All Action Alternatives, except there are differences between the alternatives which may affect the risk of potential impacts on habitat for Coeur d'Alene salamanders, including acres impacted by treatment activities and/or beetle infestation, miles of road construction, miles of existing road scheduled for restoration, and the number of culverts for replacement or removal. (Please refer to the alternative descriptions in Chapter II.) These differences would result in minor changes in the risk of potential effects; and would not result in any measurable change in effects on Coeur d'Alene salamanders. Based on direct and indirect effects from the proposed activities and

the low risk of potential effects from the proposed activities, the cumulative effects from the proposed actions would be minor under all alternatives .

Coeur d'Alene Lake North Analysis Area

Known populations of this species exist in the analysis area. Additional potential habitat may exist in creeks and in abandoned mines.

Direct, Indirect and Cumulative Effects: The potential effects would be similar to those described under Effects Common to All Alternatives, Effects Common to All Action Alternatives and Effects by Alternative in the Hayden Analysis Area. Alternative D proposes one harvest unit and segment of road construction in the vicinity of one known Coeur d'Alene salamander site. However, Inland Native Fish Strategy buffers would ensure protection of the site. There would be no measurable increase in the risk of potential effects to Coeur d'Alene salamanders.

Coeur d'Alene Lake South Analysis Area

Several known populations of Coeur d'Alene salamanders exist within the analysis area; some are not on National Forest system land. Potential habitat exists in unsurveyed creeks and in abandoned mines present within the analysis area.

Direct, Indirect and Cumulative Effects: The potential effects would be similar to those described under Effects Common to All Alternatives, Effects Common to All Action Alternatives and Effects by Alternative in the Hayden Analysis Area; with the following differences. Under Alternative B, C, D, E and G, implementation of a road obliteration project adjacent to known sites may impact the Coeur d'Alene salamander. Design features and mitigation for the protection of Coeur d'Alene salamander sites (for example, timing restrictions and requirements for the disposal of excavated fill) would minimize potential direct impacts; habitat and the population would be maintained. However, the possibility exists that individuals may be impacted by the proposed road obliteration (for example, individual salamanders that may be under the culvert at the time of implementation). Because habitat at the stream site would be maintained, the direct, indirect, and cumulative effects from the proposed actions under these alternatives would be moderate, and populations would not be affected.

Chain Lakes Analysis Area

Coeur d'Alene salamanders have not been documented in the Chain Lakes Analysis Area. However, they have been found just outside the analysis area and would likely occur here.

Direct, Indirect and Cumulative Effects: The direct, indirect, and cumulative effects are the same as those described under Effects Common to All Alternatives, Effects Common to All Action Alternatives and Effects by Alternative in the Hayden Analysis Area.

Steamboat Analysis Area

Coeur d'Alene salamanders have not been documented in the Steamboat Analysis Area. They have been found in other streams outside the analysis area. The area likely provides habitat for the Coeur d'Alene salamander.

Direct, Indirect and Cumulative Effects: The direct, indirect, and cumulative effects would be the same as those described under Effects Common to All Alternatives, Effects Common to All Action Alternatives and Effects by Alternative in the Hayden Analysis Area.

Bumblebee Analysis Area

The Coeur d'Alene Salamander has not been documented in the Bumblebee Analysis Area. However, it is known to occur north of the analysis area in Laverne Creek. It is likely that Coeur d'Alene salamanders exist within the Bumblebee Analysis Area.

Direct, Indirect and Cumulative Effects: The direct, indirect, and cumulative effects would be the same as those described under Effects Common to All Alternatives, Effects Common to All Action Alternatives and Effects by Alternative in the Hayden Analysis Area.

Hart Analysis Area

There are no known Coeur d'Alene salamander sites within the Hart Analysis Area.

Direct, Indirect and Cumulative Effects: The direct, indirect, and cumulative effects would be the same as those described under Effects Common to All Alternatives, Effects Common to All Action Alternatives and Effects by Alternative in the Hayden Analysis Area.

FISHER

Methodology

To assess potential effects and compare alternatives, the analysis applied methods and management guidelines from "Fisher Biology and Management in the Western United States" (Heinemeyer and Jones, 1994) to integrity areas as identified in the Geographic Assessment. Because of some dissimilarities in scale between the two documents being used and in an effort to incorporate the most recent information available, some extrapolation of the guidelines is required. Integrity areas are those with low-road densities in comparison to the remaining areas on the district, and with a higher proportion of habitat for wide-ranging furbearers. "High" integrity areas are those with the lowest road densities.

In high integrity areas, the analysis used 45% of the area in mature or older forest as a guideline against which to measure potential effects. In moderate integrity areas, the analysis used 40% of the area in mature or older forest as a guideline against which to measure potential effects.

Guidelines for low quality subdrainages have been applied to low integrity areas from the Geographic Assessments. Outside of high and moderate integrity areas, the analysis used 30% of the area in mature or older forest as a guideline against which to measure potential effects.

The percentages above are consistent with recommendations for using the historical range of variability to determine guidelines for fisher habitat. In the Coeur d'Alene River drainage the historical range of variability for mature and old forest is 23% to 55% (Coeur d'Alene River Basin Geographic Assessment, USDA Forest Service, 1998).

There is an increase in fisher habitat from draft to final EIS due to modifications of the habitat queries. Original queries erroneously missed habitat types that are used by the fisher. For the Final EIS these habitats were incorporated, resulting in more habitat identified for the fisher within the analysis areas.

During development of the Draft EIS, information on the effects of beetle mortality upon fisher habitat was not complete; as a precaution, no regeneration harvests were proposed in fisher habitat. Review of fisher habitat for the Final EIS found beetle mortality would reduce canopies of proposed regeneration units below what is usable by the fisher. Analysis found that some proposed regeneration acres would lose their canopy

closure as a result of the beetle activity to a level below what could be used by the fisher, pine marten, denning lynx, or goshawk. In a change from the Draft EIS to the Final EIS, regeneration harvest would now be allowed to occur in fisher habitat.

In the proposed selection harvest units, harvest activities would result in less than a 5% change in the canopies that would result from beetle mortality. For analysis purposes the 5% additional loss of canopy was considered a minor effect. Under all action alternatives, units proposed for selection harvest would not impact the vegetative characteristics of suitable fisher, pine marten, lynx, or goshawk habitat. Live canopy closure would vary slightly from what would occur under Alternative A. Habitat would still be usable provided that the design feature for snags and downed woody material for soil productivity was implemented. Small holes in the canopy, resulting from beetle-related tree mortality or harvest activities, were not considered to be unusable by fishers. Historically, canopies had small openings caused by small fires, dying trees, and wind damage (Jones, 1991). Fisher can travel through or around these small openings.

Foreseeable actions are part of the cumulative impacts for the fisher analysis. The foreseeable actions that would affect fisher habitat are in the planned Huckleberry Ice and Horizon Moon timber sales. Both sales would harvest some suitable and capable fisher habitat. This loss of habitat is considered a minor impact on fisher habitat.

Under Alternative D, commercial thinning of ponderosa pine would alter the canopy closure to a level not usable by the fisher or goshawk. Design features in Chapter II provide prescription modifications in western larch stands that lie within suitable habitat, that maintain a canopy closure usable by fisher (50% canopy closure). The proposed ponderosa pine thinning areas are generally inherently patchy, with drier ponderosa pine patches scattered throughout the stands. Those drier areas do not provide preferred fisher habitat. Thinning would only occur within the patches of ponderosa pine, leaving the wetter habitats unthinned and continuing to provide habitat for fisher. Supplemental information and maps are provided in the project files ("Wildlife").

Effects Common to All Action Alternatives

Values for vegetative habitat are different from those displayed in the Draft EIS, because earlier computer database queries erroneously omitted some habitat types that are of value to fisher.

Analysis of the fisher reflects changes in habitat for the marten, since their habitat needs are similar. Alternatives were modified to reduce impacts to fisher. Existing open road densities within analysis areas are moderate to high, contributing to relatively high vulnerability or low security for fisher. Design features would manage access to an extent that temporary, barriered, and non-driveable roads used to implement the Decision would remain restricted to motorized use (except for administrative use) during the implementation phase of the project, including post sale activities.

During sale activity, roads would be opened that are currently closed. As described in the features of the alternatives, any newly opened road would be gated during the sale activity. This feature would prevent established long-term use of the roads. Disturbance and loss of security would be short term on the majority of roads, where closures would occur within the same season of use.

Monitoring has determined that obliterated roads result in negligible effects to security, since the roads are harder to find. New road construction and brushed-in roads in suitable fisher habitat that are opened for the project would be concealed (with slash piles) during periods of non-use (for example, during the winter) to reduce use by motor vehicles, including snowmobiles. All temporary roads and roads that are currently impassable (brushed in or have downed logs, etc.) that are used in association with this project would be obliterated and/or concealed after sale-related activities are complete to reduce use by motor vehicles, including snowmobiles. These measures would reduce potential risk of incidental trapping mortality and would avoid long-term disturbance in fisher habitat.

All action alternatives would affect wildlife security, but would differ in the amount of access provided. For example, no new road construction is proposed under Alternative C, but roads that are currently unpassable could be opened for use in association with this project. Alternatives B, D, E, and F propose construction of temporary roads that would be obliterated after completion of post-sale activities. Of the alternatives, Alternative D proposes the most new road construction, including nearly 5 miles of road that would be left in place after the project. These roads would have a slight additional effect on wildlife; although the roads would be closed, the road prisms would remain visible.

Under Alternatives A through F, open road densities in all analysis areas except Bumblebee and Steamboat would be reduced from the existing condition within five years, in association with past and ongoing timber sales. In some cases road closures would be improved (an earth barrier would be replaced with a front-end obliteration). Obliteration of roads that are currently open (or that are closed but not brushed in) would improve wildlife security. In some analysis areas, open road densities would be reduced beyond what would occur under Alternative A, due to closures associated with this project. These closures would improve security for fisher.

Under Alternatives A through F, there would be improved closures on currently closed roads in all analysis areas except Bumblebee, which would decrease the risk of trapping for fisher. For example, in the high integrity area of the Coeur d'Alene Lake North analysis area, approximately 30 miles of road that are currently closed by earth barrier would be obliterated. Design features specified for inland fisheries (under the Inland Native Fish Strategy) would in most instances maintain connectivity through riparian corridors and valley bottoms for both fisher and marten. Within approximately 5 years, there would be a minor to moderate improvement in security for fisher. The table below displays the potential reduction in open road density under each alternative. The Project Files ("Wildlife") also provide supporting information regarding roads with improved closure types.

Road obliteration occuring as part of the proposed watershed restoration work on roads that are currently opened and barriered but not brushed in would improve security for wildlife. A front-end obliteration would be used on all roads scheduled for culvert removal.

Table III-92. Open road density (miles of open road per square mile of land area) post sale, Coeur d'Alene River Ranger District.

Analysis Area	Existing	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Hayden	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Coeur d'Alene North	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Coeur d'Alene South	1.9	1.6	1.2	1.2	1.2	1.2	1.4	1.2
Chain Lakes	2.3	1.6	1.0	1.0	1.0	1.0	1.3	0.9
Bumblebee	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.7
Steamboat	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.0
Hart	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.3

Alternative G

Only prescribed burning and watershed restoration activities would occur under Alternative G. No timber harvest would occur in any of the analysis areas, and there would be no new construction of either temporary or system roads. Effects to timber stands that provide fisher habitat would be expected to be only slightly higher than the effects that would occur under Alternative A, from the beetle-related tree mortality. Road obliterations would benefit fishers as well as other furbearers. Since Alternative G would have only slight, negative effects and the area would trend toward improved fisher habitat, this alternative does not warrant further analysis for the fisher.

Table III-93. Changes in acres of fisher habitat, by alternative, Coeur d'Alene River Ranger District.

Analysis Area	Habitat	Existing	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Hayden	suitable-high	512	502	496	496	500	500	499	502
	suitable-low	1,705	1,619	1,619	1,619	1,571	1,603	1,575	1,619
	capable-high	1,409	*	*	*	*	*	*	*
	capable-low	10,613	*	*	*	*	*	*	*
Coeur d'Alene Lake North	suitable-high	6,852	6,327	6,231	6,231	6,162	6,231	6,231	6,327
	suitable-low	2,078	2,055	2,055	2,055	2,055	2,055	2,053	2,055
	capable-high	15,806	*	*	*	*	*	*	*
	capable-low	5,834	*	*	*	*	*	*	*
Coeur d'Alene Lake South	suitable-low	3,891	3,616	3,611	3,611	3,611	3,616	3,616	3,616
	capable-low	14,579	*	*	*	*	*	*	*
Chain Lakes	suitable-low	2,948	2,798	2,793	2,793	2,798	2,774	2,770	2,798
	capable-low	8,792	*	*	*	*	*	*	*
Bumblebee	suitable-mod	1,364	1,360	1,360	1,360	1,360	1,360	1,360	1,360
	suitable-low	523	523	523	523	523	523	523	523
	capable-mod	3,785	*	*	*	*	*	*	*
	capable-low	1,950	*	*	*	*	*	*	*
Steamboat	suitable-mod	667	667	667	667	667	667	667	667
	suitable-low	395	395	395	395	395	395	395	395
	capable-mod	2,923	*	*	*	*	*	*	*
	capable-low	600	*	*	*	*	*	*	*
Hart	suitable-mod	637	637	637	637	637	637	637	637
	suitable-low	355	297	297	297	297	297	297	297
	capable-high	98	*	*	*	*	*	*	*
	capable-mod	4,108	*	*	*	*	*	*	*
	capable-low	1,569	*	*	*	*	*	*	*

"High" = habitat within a High Integrity Area
"Mod" = habitat within a Secondary Integrity Area
"Low" = habitat outside of either a High or Secondary Integrity Area

*** indicates capable habitat acres would not change. Despite alterations, these stands would maintain the ability to provide habitat for the fisher. Refer also to the table below.**

The table below displays the number of acres of capable fisher habitat that would have canopies altered by beetles and proposed activities. These acres would maintain the ability to eventually provide habitat for fisher; however, reductions in canopy would increase the time frame needed for the habitat to be provided.

Table III-94. Acres of capable fisher habitat that would have canopies altered by beetles and proposed activities.

Analysis Area	Habitat	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Hayden	capable-high	140	140	140	140	140	140	140
	capable-low	730	795	795	834	795	789	730
Coeur d'Alene Lake North	capable-high	527	590	590	708	527	590	527
	capable-low	49	53	53	55	118	51	49
Coeur d'Alene Lake South	capable-low	674	743	743	751	743	674	674
Chain Lakes	capable-low	277	391	391	424	359	386	277
Bumblebee	capable-mod	18	18	18	18	18	18	18
	capable-low	0	0	0	0	0	0	0
Steamboat	capable-mod	0	0	0	0	0	0	0
	capable-low	0	0	0	0	0	0	0
Hart	capable-high	0	0	0	0	0	0	0
	capable-mod	0	0	0	0	0	0	0
	capable-low	25	25	25	25	25	25	25

Hayden Analysis Area

Streams and adjacent stands provide habitat within the analysis area. Due to recreational disturbance, the more likely areas for potential use lie within the southern portion of the analysis area, within the High Integrity Area. With the exception of the High Integrity Area, the Hayden area is not emphasized for fisher management due to the high recreational disturbance and proximity to a growing population. The capable habitat varies in structure and age class. Some of the stands could feasibly provide habitat for the fisher in 25 to 50 years. Other capable stands may have the correct tree species composition but are very young and it may be over 100 years before they are providing habitat for the fisher. Currently the Hayden Analysis Area falls below the acres desired in fisher denning habitat. No additional loss of denning habitat should occur. Table III-93 displays the changes that would occur in the amount of fisher habitat under each alternative. There would be less than 5% difference in canopy losses between Alternative A and the action alternatives.

Direct and Indirect Effects

Alternative A: Under Alternative A, approximately 96 acres of suitable habitat would no longer provide habitat for the fisher because of beetle-related tree mortality. Approximately 870 acres of capable habitat would maintain its capability to eventually provide for fisher; however, stands on these acres have been altered and would require a longer amount of time to provide the canopies necessary for fisher habitat. The beetle infestation will alter canopy closure to a level below those utilized by the fisher. This canopy loss would result in a 7% reduction of fisher habitat. Foreseeable activities would not include any additional roading in fisher habitat. The anticipated beetle-related tree mortality would further reduce fisher denning habitat below optimal levels.

Alternatives B, C and E: Under Alternatives B, C, and E, between 6 and 18 acres of fisher habitat (beyond the beetle-affected acres under Alternative A) would no longer have sufficient canopies to meet the needs of the fisher. Under Alternatives B and C, six of these acres lie within the high integrity area. Under Alternative E, two acres lie within the high integrity area. This amount of harvest would have a negligible impact on the fisher, considering that these stands would not likely provide optimal habitat because of Douglas-fir beetle-related tree mortality. The degree to which harvest would reduce canopy beyond that caused by beetle mortality would be minimal, with less than a 5% difference in canopies under Alternative A compared to

Alternatives B, C and E. These alternatives would further reduce denning habitat (as would Alternative A), which is currently in short supply.

There would be no change in capable habitat within the high integrity area under Alternatives B, C and E beyond the results of beetle mortality. Outside the high integrity area, capable fisher habitat would be set back on 65 acres in addition to the losses from the beetle infestation. This means it would take a longer period of time until these stands provide habitat for the fisher.

Under Alternatives B, C and E, there would be no reconstruction of roads bisecting fisher habitat within the Hayden Analysis Area. There would be no new road construction under Alternative C. Therefore, Alternative C would not increase the incidental risk of trapping for the fisher. Effects of Alternatives A and C would be similar.

Alternatives B and E would receive the same amount of temporary road construction. These roads would be obliterated after the sale. There would be no new permanent roads with the implementation of either of these alternatives.

Alternatives D and F: Alternatives D and F would reduce suitable fisher habitat within the high integrity area by 2 to 3 acres beyond the effects of beetle mortality. Suitable habitat outside the high integrity area is reduced by 48 to 44 acres beyond the effects of beetle mortality. The fuelbreak proposed under Alternative F (within the High Integrity Area) would have the most long-term impact to fishers. Like Alternatives B, C, and E, the degree to which harvest would reduce canopy beyond beetle mortality is minimal, with less than a 5% difference in canopies between beetle-related mortality and the effects of harvest. Denning habitat would continue to be in short supply.

Increased openings by roads would indirectly impact the fisher within the High Integrity Area by increasing the risk of trapping mortality, as described above. Under Alternative D, two roads would be reconstructed through fisher habitat, none within the high integrity area. Under Alternative F, one road would be reconstructed through fisher habitat. Of all alternatives, Alternative D would have the most impact in terms of system road construction. Alternative F would have fewer temporary roads constructed than would Alternatives B, D, and E, and no new system (permanent) road construction. Of all the alternatives, risk of incidental trapping would be highest under Alternative D. This risk would be lower under Alternative F than under Alternatives B, D and E.

Cumulative Effects Under All Alternatives

Based on past reductions of suitable habitat and security, the cumulative effects would be considered high. Alternatives B, C and E would result in a minor reduction of security and suitable fisher habitat. Alternative D would have a minor impact on security. The alternative design features and migitation measures (described in Chapter II) would reduce the risk of security loss. Alternative E would have no effects to suitable habitat and minor effects to security. The minor short-term decrease or long-term increase in security due to proposed project activities would be minor except under Alternatives D and F. The proposed fuelbreak within the High Integrity Area under Alternative F would have a high level of cumulative effects. All alternatives (including Alternative A) would reduce denning habitat, primarily due to the beetle activity. Alternative A would have an impact upon canopy closure in fisher habitat and could impact individuals. The action alternatives were designed to reduce impacts to fisher habitat, and would have short-term disturbances and only a minor effect beyond that caused by the beetle. Under all alternatives, there could be an impact individuals, but none of the alternatives would likely trend the species toward federal listing or cause a loss of viability to the species or population.

Coeur d'Alene Lake North Analysis Area

Streams and adjacent stands provide some habitat within the analysis area. Human development outside the Forest boundary has encroached upon historic fisher habitat. This has made habitat on the National Forest more important to the fisher. The Coeur d'Alene North area lies primarily within a high integrity area. This area has relatively lower road densities than many other areas of the district. In addition, suitable fisher habitat and habitat for other large ranging furbearers occurs in higher amounts compared to other areas. Within the high integrity area there is a shortage of capable denning habitat. Horizon Moon, a reasonably foreseeable action that will occur under all alternatives, includes construction of a new road that would bisect fisher habitat.

Effects Common to All Action Alternatives

Under all action alternatives, there would be approximately 30 miles of road obliterated or closed with earth barriers, which would improve security for fisher.

Direct and Indirect Effects

Alternative A: Under Alternative A , approximately 548 acres of suitable habitat and 576 acres of capable habitat would no longer provide habitat for the fisher because of beetle-related tree mortality. The beetle infestation reduces canopy closure to levels below those utilized by the fisher. This canopy loss is a reduction of 6% of the current fisher habitat. Foreseeable actions would occur with this alternative however, there would be no additional roading in fisher habitat that would occur. Capable denning habitat within the High Integrity Area would continue to be in short supply.

Alternatives B, C, E and F: Within the high integrity area, 96 acres of suitable fisher habitat (beyond the area affected under Alternative A) would have canopies reduced lower than the needs of the fisher. These acres would have provided habitat for the fisher if just beetle-related tree mortality occurred in the stand.

Under these four alternatives, between 2 and 69 acres of capable habitat would have canopies reduced beyond what the beetles infestation alone would do. Although at the current time these stands are not providing habitat for the fisher, harvest would result in a longer time frame before these capable stands become suitable habitat for the fisher. Prescribed burning outside units in Alternative F would have a very minimal effect (5 acres) upon fisher habitat.

Under Alternatives B, E and F, two roads that bisect fisher habitat would be reconstructed. One of these roads would also be reconstructed under Alternative C. These roads all lie within a High Integrity Area. There would be no road construction in Alternative C. Risks of incidental trapping would be lower than the other action alternatives, in this alternative. Due to new temporary road construction, there would be a short term increased risk of incidental trapping of fisher in Alternatives B, E and F. These alternatives would continue to reduce the amount of capable denning habitat, as would occur under Alternative A.

Alternative D: This alternative would have the greatest changes in suitable habitat within the high integrity area of any of the alternatives. Approximately 165 acres of suitable habitat would have reductions in canopies beyond what beetle-related tree mortality would do. However, with the exception of ponderosa pine thinning units, the change in canopy closure between what the beetle would do and what harvest activities would do is less than 5%. Harvest in ponderosa pine thinning and larch thinning units would reduce the canopies of these stands to a canopy closure below what the fisher would use. Modifications in the harvest prescription (such as reducing the amount of canopy removed) would mitigate this concern.

With the implementation Alternative D, three roads would be reconstructed through suitable and capable fisher habitat within the high integrity area. These are temporary roads that would be obliterated after harvest. However, the roads would result in a short-term increase in risk of incidental trapping. Placement

of slash or similar obstructions at road entrances would reduce the potential for incidental trapping takes (please refer to the discussion on Mitigation Measures in Chapter II). In addition, this alternative construct two miles of new system road. These system roads would be located in an area that already has a high degree of motorized recreational use and provides little security. The entrance of the roads would be gated. Placement of slash or similar obstructions at road entrances (other than system roads) would reduce the potential for incidental trapping takes during periods of non-use and after sale activities are complete (please refer to the discussion on Mitigation Measures in Chapter II). Capable denning habitat would continue to be in short supply.

Cumulative Effects

Past activities have severely reduced suitable fisher habitat; there is currently a 200-acre shortage of denning habitat. Cumulative effects are high. There has been a minor to moderate reduction in security. The proposed project and foreseeable projects have only a slight effect upon the vegetative component of fisher habitat beyond the effects of the beetle. The loss of security from the proposed project is minor and short term, except under Alternative D, which would result in a moderate and short-term loss of security. The action alternatives were designed to address most security concerns. Cumulatively, combined with ongoing and foreseeable sales, the security loss is moderate. Within 5 years, there would be a minor to moderate increase in security. Overall, except for Alternative D, cumulative effects would be considered minor. Cumulative effects under Alternative D would be considered moderate due to the loss of security that would result from road construction and reconstruction of system roads, which increases corridors that could increase risk of fisher trapping. Due to the amount of system roads, cumulative effects of Alternative D would be minor to moderate.

All alternatives (including Alternative A) would reduce denning habitat, primarily due to the beetle activity. Alternative A would have an impact upon canopy closure in fisher habitat and could impact individuals. The action alternatives were designed to reduce impacts to fisher habitat, and would have short-term disturbances and only a minor effect beyond that caused by the beetle. Under all alternatives, there could be an impact individuals, but none of the alternatives would likely trend the species toward federal listing or cause a loss of viability to the species or population.

Coeur d'Alene Lake South Analysis Area

Streams and adjacent stands may provide some habitat within the analysis area. This area does not lie within a high or low integrity area for furbearers. Within Coeur d'Alene Lake South, there are 3,891 acres of suitable habitat and about 14,579 acres of capable habitat. This capable habitat varies in structure and age class. Some of the stands could feasibly provide habitat for the fisher in 25 to 50 years. Other capable stands may have the appropriate tree species composition but are very young. It may be over 100 years before they provide habitat for fisher. The Coeur d'Alene South Analysis Area is lacking approximately 480 acres of denning habitat.

Direct and Indirect Effects

Alternative A: Under Alternative A, approximately 275 acres of suitable habitat would no longer provide habitat for the fisher because of beetle-related tree mortality. Another 674 acres of capable habitat would have canopies reduced and would result in an increase in the amount of time required for the capable stands to provide suitable fisher habitat. The beetle infestation alters canopy closure levels that are below those utilized by the fisher. This canopy loss is a reduction of 5% of the current fisher habitat. Tree mortality associated with the beetle activity would result in a loss of more denning habitat (the area already has a shortage of denning habitat). Foreseeable actions would occur with this alternative. However, there would be no additional roading in fisher habitat. Approximately 12 miles of roads would be closed by foreseeable projects, reducing open road densities.

Alternatives B, C and E: Alternative E would have the same effects on suitable fisher habitat as Alternative A. Under Alternatives B and C there is an additional five acres of impacts to suitable habitat beyond the beetle-related tree mortality represented in Alternative A. In capable habit, the three alternatives alter an additional 69 acres beyond what beetle-related tree mortality would do. These 69 acres would continue to have potential to provide fisher habitat, however the time frame is increased. There would be new temporary road construction with the implementation of these alternatives, however there would be no new system roads in this area under these alternatives.

Alternative D: With the implementation of Alternative D there is a alteration of an additional 5 acres of suitable habitat beyond what beetle-related tree mortality would do. There is another 77 acres of capable habitat reduced beyond the impacts of beetle-related tree mortality. There is no new system road construction within Coeur d'Alene South under this or any of the alternatives. There would be new temporary road construction in the area. One road that bisects fisher habitat would be reconstructed (the road was obliterated in the past). As under all of the action alternatives, the newly-constructed temporary roads would be obliterated.

Alternative F: Alternative F would result in the same vegetative changes that would occur naturally because of the bark beetle. There is no new system road construction in this area under Alternative F. Burning outside the units in Alternative F would have no negative impacts upon fisher habitat. As under Alternative A, there would be a continued trend in the shortage of denning habitat.

Effects Common to All Alternatives

The majority of the loss of security would be short term. Any roads that are currently brushed in and reconstructed would lead to a short-term reduction in quality security and increased risk of trapping. Slash piles at road entrances that have been brushed out or newly constructed would mitigate the impacts of increased risk. Within 5 years, there would be more roads closed than the existing condition under all alternatives. Road closures would result in lower road densities.

Cumulative Effects

Based on past severe reductions in suitable habitat and moderate reductions in security, cumulative effects would be considered moderate. There would be a minor short-term loss of security as a result of proposed project activities under the action alternatives. Within 5 years, there would be a minor to moderate increase in security under all alternatives. A shortage of denning habitat would continue under all alternatives, including the No-Action Alternative. Cumulatively, there would be a moderate impact to fisher.

Alternative A would have an impact upon canopy closure in fisher habitat and could impact individuals. The action alternatives were designed to reduce impacts to fisher habitat, and would have short-term disturbances and only a minor effect beyond that caused by the beetle. Under all alternatives, there could be an impact individuals, but none of the alternatives would likely trend the species toward federal listing or cause a loss of viability to the species or population.

Chain Lakes Analysis Area

Fisher have been sighted from 1978 to 1982 in the vicinity of Black Lake in the Chain Lakes Analysis Area. The sightings did not occur on National Forest lands. Based on past sightings and habitat, the Chain Lakes Analysis Area is one of the more likely places in the Coeur d' Alene Mountains for fisher to occur. Habitat queries showed there are 8,890 acres of capable habitat, of which 2,948 acres are identified as suitable fisher habitat on National Forest lands in this Analysis Area. Some capable habitat is currently not providing for the needs of the fisher, but because of tree species composition and topography, would be suitable for the fisher in the future. Because of the large amount of capable habitat found, an inference can be made that historical fisher habitat was much more abundant within the Chain Lakes Analysis Area. The Chain Lakes

Analysis Area currently exceeds the recommended amount of denning habitat. The current road density in the Chain Lakes area is 2.3 miles of road per square mile of area.

Direct and Indirect Effects

Alternative A: Beetle mortality in the Chain Lakes area would reduce the canopy closure on 200 acres of suitable habitat, to a level below what is needed by the fisher. Another 277 acres of capable habitat would be altered by the beetles and would require a longer time span to provide suitable habitat for the fisher. The 98 acres of capable habitat within the high integrity area would continue to provide habitat for the fisher. Since there is currently an abundance of fisher denning habitat, the effects of the beetle should not make the Chain Lakes Analysis Area unusable by the fisher. There is no change in roading associated with this alternative. Foreseeable projects will result in closure of approximately 19 miles of road.

Alternatives B and E: An additional 5 to 24 acres of suitable fisher habitat would be reduced in value for the fisher beyond the effects of beetle mortality. Under both alternatives there would be some construction of temporary roads. After post-sale activities approximately 14 miles of road would be obliterated. The remaining roads would have barriers at the entrances. Newly-constructed roads, barriered roads, and brushed in roads would all have gates installed during sale activity. Once post-sale activity is completed most gates would be replaced with earth barriers or obliterations, for more secure closures. Under these alternatives, two roads that bisect fisher habitat would be reconstructed. Sufficient denning habitat would continue to be provided.

Alternative C: The impacts of vegetation in Alternative C is the same as described in Alternatives B & E. However, alternative C has no new road construction. Additional risk of incidental trapping would be low. One road bisecting fisher habitat would be reconstructed. Denning habitat would continue to be provided in adequate amounts.

Alternative D: The implementation of this alternative would alter 28 acres of suitable fisher habitat beyond what the beetle would do. In the capable habitat there would be an additional 147 acres of habitat altered beyond what beetle activity would do. This habitat would some day still provide suitable habitat for the fisher, however harvest activities would lengthen the time needed before these units provide habitat for the fisher. This alternative has the most construction of new temporary roads. Under these alternatives, two roads that bisect fisher habitat would be reconstructed. There would be a greater short-term increase in the risk of incidental trapping associated with this alternative. Denning habitat would continue to be provided in sufficient amounts.

Alternative F: Alternative F would have similar harvest as Alternatives B and C. Suitable habitat would be reduced by 28 acres above beetle mortality. Capable habitat would be altered an additional 108 acres beyond what beetle mortality would cause. Roading would be the same as Alternative B. One road bisecting fisher habitat would be reconstructed. Denning habitat would continue to be adequate.

Cumulative Effects

Past activities have severely reduced security, resulting in high cumulative effects. There are minor effects to suitable fisher habitat under all alternatives from this project. Denning habitat would be maintained under all alternatives. Cumulative effects would be considered high. There would be a reduction in open road densities. Open roads and lack of security on private lands would result in high cumulative effects.

Alternative A would have an impact upon stand canopies in fisher habitat. The remaining alternatives have only a minor effect beyond the effects of the beetle. Action alternatives were modified to reduce impacts to the fisher. Alternative A may impact individuals because of reductions in canopies. Alternatives B, C, D, E, F and G would have minor additional effects to canopies and short-term disturbance. Under all alternatives

there may be an impact to individuals, but would not likely trend the species towards federal listing or cause a loss of viability to the species or population.

Steamboat Analysis Area

This area falls within a Secondary High Integrity Area for furbearers, where low road densities are important. There are 1,062 acres of suitable habitat and 3,523 acres of capable habitat for fisher within the Steamboat Analysis Area. Barrymore Creek provides a travel corridor of suitable habitat for the fisher. Historically, the North Fork of the Coeur d'Alene River was a likely travel corridor for fisher. Roading and habitat alterations along the North Fork have compromised the integrity of this corridor. Suitable fisher habitat is also suitable for the marten. Marten most likely occupy the Steamboat Analysis Area, most likely in mature forest stands. Two compartments are below minimum viability for snags which make the habitat less than optimal for the marten. The area is easily accessible for winter travel and marten populations have probably been reduced by trapping. There is more than an adequate amount of fisher denning habitat within the Steamboat Analysis Area.

Alternatives A through F

Direct and Indirect Effects: Based on predictions of what would happen to fisher habitat as beetle-related tree mortality progresses, the needs of the fisher, and the area that is proposed for selective harvest, there would be no change in fisher habitat under any alternative. Road 6421 bisects a security area that lies within the Secondary Habitat Integrity Area. This security area would be maintained under the No-Action Alternative and Alternative F. However, security would be reduced over the short term under the other alternatives. Sufficient denning habitat would remain under all alternatives.

Cumulative Effects: The suitable habitat and security has been moderately reduced due to past activities. This project would not reduce suitable fisher habitat. All action alternatives except Alternative F would moderately reduce security for the short-term. Over the long term, proposed project activities would not improve security. Cumulative effects would be considered moderate.

Alternative A and F would have an impact upon stand canopies in fisher habitat. The remaining alternatives have only a minor effect beyond the effects of the beetle. Action alternatives were modified to reduce impacts to the fisher. Alternative A may impact individuals because of reductions in canopies. Alternatives B, C, D, E, and G would have minor additional effects to canopies and short-term disturbance. Under all alternatives there may be an impact to individuals, but would not likely trend the species towards federal listing or cause a loss of viability to the species or population.

Bumblebee Analysis Area

The Little North Fork, Bumblebee Creek, and the other streams in this analysis area may provide fisher habitat and travel corridors. The area falls within a Secondary Habitat Integrity Area for furbearers. These areas were designed based on past sightings and current low road densities in relation to the road densities on the rest of the Coeur d'Alenes. There are approximately 1,887 acres of suitable habitat and 5,735 acres of capable habitat for fisher in the Bumblebee Analysis area. The capable habitat varies in structure and age class. Some of these stands could feasibly provide habitat for the fisher in 25 to 50 years. Other capable stands may have the correct tree species composition but are very young. It may be over 100 years before they are providing habitat for the fisher.

Alternatives A through F

Direct and Indirect Effects: Suitable habitat that has Douglas-fir infected with beetles would lose some canopy as the mortality by beetle progresses. Under Alternatives A through F, It is predicted that less than 4

acres of currently suitable habitat would be lost to a canopy closure level below what is usable by the fisher. All alternatives would have canopies reduced on 18 acres of fisher habitat. No change in current roading would occur and there would be no further fragmentation under Alternative A.

The acres harvested by selection method would continue to provide fisher habitat. The opening of Road 1521 would reduce security within the Bumblebee Analysis Area. Under all action alternatives except Alternative F, one road that bisects fisher habitat would be reconstructed (the road was previously obliterated).

Cumulative Effects

There has been a severe reduction in suitable habitat from past activity, resulting in high cumulative effects. The proposed project activities would not reduce suitable habitat beyond what would occur with the beetle activity. Denning habitat would be maintained at current levels. Cumulative effects to security from the proposed treatment under the action alternatives would be minimal, returning to existing levels following obliteration of Road 1521. Overall, cumulative impacts would be moderate.

Alternative A would have an impact upon stand canopies in fisher habitat. The remaining alternatives have only a minor effect beyond the effects of the beetle. Action alternatives were modified to reduce impacts to the fisher. Alternative A may impact individuals because of reductions in canopies. Alternatives B, C, D, E, F and G would have minor additional effects to canopies and short-term disturbance. Under all alternatives there may be an impact to individuals, but would not likely trend the species towards federal listing or cause a loss of viability to the species or population.

Hart Analysis Area

The Hart analysis area contains 992 acres of suitable habitat and an additional 5,677 acres of capable habitat for fisher.

Alternatives A through F

Direct and Indirect Effects: Due to planned wildlife and watershed restoration projects, there would be a net reduction in roads within the Hart Analysis Area. Suitable fisher habitat would be minimally reduced by the Douglas-fir beetle-related tree mortality and provide less than optimal habitat.

There would be no harvest of fisher suitable habitat within the Secondary High Integrity Area under any of the alternatives. Outside the Secondary High Integrity Area there would be modification of fisher habitat. Under all alternatives, including Alternative A, canopy loss would occur on 58 acres of suitable fisher habitat that lies outside the High Integrity Area. There would be 25 acres of capable habitat that would have canopies reduced below what is needed by the fisher under all alternatives. Creation of temporary roads in some alternatives and new system road construction (under Alternative D) would reduce security during sale activities and could increase the risk of incidental trapping post-sale. Under all alternatives except Alternative C, one newly-constructed road would bisect fisher habitat within the High Integrity Area.

Temporary road construction would occur within the Secondary Integrity Area under Alternatives B, D and E. This would reduce security for the fisher in the short term.

Under Alternative C, there would be no temporary road construction within the Secondary High Integrity Area due to an increase in the number of helicopter-logged units. In addition, there would be no temporary road or new system road construction outside of the Secondary High Integrity Area. There would be less increased risk of incidental trapping of the fisher under Alternative C than under Alternatives B and E.

Roading and harvesting under Alternative F would be the same as under Alternatives B, D and E. Under all alternatives, including Alternative A, the area would continue to be low in denning habitat.

Cumulative Effects: Past activity has reduced habitat for the fisher, resulting in high cumulative effects. This project has a minor effect on security for the short term, except in Alternatives A and C. After road closures occur in Rookie Hart timber sale and the Douglas-fir beetle project are completed, road densities in the Hart Analysis Area would be reduced from the current level. There would be minor effects to suitable fisher habitat, although Alternative F would most likely have more impacts due to canopy loss resulting from underburning. Cumulative effects would be considered high due to past alterations of suitable habitat and security.

Alternative A would have an impact upon stand canopies in fisher habitat. The remaining alternatives have only a minor effect beyond the effects of the beetle. Action alternatives were modified to reduce impacts to the fisher. Alternative A may impact individuals because of reductions in canopies. Alternatives B, C, D, E, F and G would have minor additional effects to canopies and short-term disturbance. Under all alternatives there may be an impact to individuals, but would not likely trend the species towards federal listing or cause a loss of viability to the species or population.

FLAMMULATED OWL

The following sections analyze the effects of the alternatives on flammulated owls and their habitat. The table displays the acres remaining of suitable and capable habitat after the treatments proposed in each alternative. Refer to the text for details on individual analysis areas. There have been slight changes in the acres of suitable and capable flammulated owl from the Draft EIS because the original query did not include slope requirements. Please refer also to the project files "Wildlife," (Flammulated Owl folder) for additional tables and maps supporting the following analysis information.

Effects Common to All Action Alternatives

Historically, the project area provided optimal flammulated owl habitat, primarily on dry habitats at lower elevations. Flammulated owl habitat in the Lower Clark Fork drainage, which includes the Coeur d'Alene Basin, has been reduced by 95% (Wisdom, in press).

Much of the habitat loss is due to urban and agricultural development at low elevations outside the forest boundary on private lands. Suitable habitats are forested areas that currently provide for the needs of the flammulated owl. Under all action alternatives, design features were incorporated to avoid harvesting in currently suitable habitat. Some of these stands may in the long term become slightly less suitable (reduced canopy closure) for the flammulated owl due to the Douglas-fir beetle, but the majority of stands that are currently suitable would maintain suitability for the flammulated owl.

The greatest impact to flammulated owl habitat will occur as a result of the ongoing Cantfield Ice salvage sale, where approximately 256 acres of harvest will occur in flammulated owl habitat.

Based on site-specific information, the units proposed for regeneration harvest within the older capable flammulated owl habitat are stands that would not maintain suitable canopy closure for the flammulated owl due to the Douglas-fir beetle attack. Therefore, the effects of all alternatives, including the No-Action Alternative, would be similar. In older capable stands that would have adequate canopy closure to provide future suitable habitat despite the beetle activity, selective treatments were proposed for maintaining this canopy closure under all action alternatives. Design features and mitigation measures common to all alternatives assures that snag levels would be met within these units.

Under all action alternatives, proposed selection harvests would not likely alter the ability of the stands to become suitable habitat since 4 to 6 large snags per acre (depending on the habitat type) would be maintained for nesting habitat. In addition, as these stands mature, snags would be created over time. A direct impact of logging could be the loss flammulated owl nests, although these older capable stands are not believed to currently be structurally optimal for nesting (they are either too dense or not old enough). To reduce this risk, surveys would occur in June in areas of potential conflict (please refer to the Mitigation Measures discussion in Chapter II).

Thinning of ponderosa pine stands would occur only under Alternative D. Thinning of the older capable ponderosa pine stands with a prescription suitable for flammulated owls would trend these stands toward an increase in the amount of suitable habitat. Under Alternative F, prescribed burning may open the stands, trending the habitat towards a condition more favorable to flammulated owls.

Under all alternatives, including Alternative A, there would be no change to suitable habitat for stands analyzed. Stands currently too dense could trend towards suitable flammulated owl habitat due to reductions in canopy resulting from the beetles. Under all alternatives in all analysis areas, except in the Steamboat Analysis Area, there would be some loss of canopy which would delay the time period in which capable stands would be suitable for nesting flammulated owls. Under the action alternatives, there would be a risk of losing an occasional nest tree to harvest. The risk is minor since design features have eliminated suitable flammulated habitat from harvest. There is a slight chance that flammulated owls could nest in older

capable stands. Because of this, under all alternatives in all analysis areas except Steamboat, the project may impact individual flammulated owls but would not trend the species towards listing or loss of viability. Within the Steamboat Analysis Area, there would be no impact to the flammulated owl.

Alternative G

No harvest would occur under Alternative G. Prescribed burning along with watershed restoration projects would occur. There would be no newly constructed system or temporary roads with the implementation of the alternative. Foreseeable actions described above would occur under this alternative. Effects to stands that provide flammulated owl habitat are expected to be similar to the effects that occur with beetle-related tree mortality (Alternative A). Burning may trend some stands, not currently suitable for flammulated owls, towards suitable owl habitat. Since this alternative has such minor effects on the flammulated owl and would probably trend towards improved habitat, this alternative does not warrant further analysis for the flammulated owl.

Table III-95. Changes in flammulated owl habitat, by alternative.

Analysis Area	Existing	Alt. A	Alts. B & C	Alt. D	Alt. E	Alt. F	Alt. G
Hayden (227,332 acres)							
Capable Habitat	3,627	*	*	*	*	*	*
Suitable Habitat	24	24	24	24	24	24	24
Chain Lakes (18,167 acres)							
Capable Habitat	3,560	*	*	*	*	*	*
Suitable Habitat	180	171	171	171	171	171	171
Coeur d'Alene Lake North (44,276 acres)							
Capable Habitat	12,120	*	*	*	*	*	*
Suitable Habitat	339	339	339	339	339	339	339
Coeur d'Alene Lake South (22,036 acres)							
Capable Habitat	3,923	*	*	*	*	*	*
Suitable Habitat	260	260	260	260	260	260	260
Bumblebee (14,124 acres)							
Capable Habitat	1,564	*	*	*	*	*	*
Suitable Habitat	86	86	86	86	86	86	86
Steamboat (8,803 acres)							
Capable Habitat	837	*	*	*	*	*	*
Suitable Habitat	0	0	0	0	0	0	0
Hart (19,656 acres)							
Capable Habitat	1,112	*	*	*	*	*	*
Suitable Habitat	0	0	0	0	0	0	0
Total Acres							
Capable	26,743	*	*	*	*	*	*
Suitable	889	880	880	880	880	880	880

* *Indicates the amount of capable habitat would not change. Despite alterations, these stands would maintain the ability to eventually provide habitat for the flammulated owl. Refer also to the table below.*

The following table displays the number of acres of capable flammulated owl habitat that would have stand canopies altered by the beetle infestation and proposed harvest activities. These acres would maintain the ability to eventually provide habitat for the flammulated owl, although the reduction in canopy would increase the amount of time needed for the habitat to meet the specie's needs.

Table III-96. Acres of capable flammulated owl habitat that would have canopies altered by beetles and proposed activities.

Analysis Area	Alt. A	Alt. B & C	Alt. D	Alt. E	Alt. F	Alt. G
Hayden	196	196	198	244	215	196
Coeur d'Alene Lake North	108	129	115	113	128	108
Coeur d'Alene Lake South	166	179	182	179	166	166
Chain Lakes	263	265	263	265	350	263
Bumblebee	18	18	18	18	18	18
Steamboat	0	0	0	0	0	0
Hart	11	11	11	11	11	11

Hayden Analysis Area

Currently, there are 3,627 acres of capable flammulated owl habitat in the Hayden analysis area, of which approximately 24 acres are identified as suitable habitat. At least half of this capable habitat has had some type of harvest.

Direct and Indirect Effects

Alternative A: Under Alternative A, trees would die, due to beetle-related mortality, within the stands of suitable and capable habitat. Because of current canopies and predictions for mortality within these stands, 196 acres of capable habitat would require a longer amount of time before providing habitat for the flammulated owl. There would be no change from the existing conditions in suitable habitat due to beetle activity. Canopy cover loss would be the driving factor in the loss of capable flammulated owl habitat. Because flammulated owls require a medium level of canopy closure, a loss of canopy would remove some stands from capability. At the same time, stands that are currently too dense for the flammulated owl's needs would benefit from reductions in canopies as a result of beetle-related tree mortality.

Alternative A would result in an increased number of large snags for use by flammulated owls for nesting or roosting. Large snags are considered an important, and sometimes limiting, habitat requirement. If canopies are not reduced below 40%, the increase in these large snags would increase habitat quality for the flammulated owl. The loss of large trees also indicates a loss of future snags as trees are no longer available for increased diameter growth.

Beetle-related tree mortality in some cases may benefit stands, allowing trees to grow larger because of reduced competition. The benefit may be off-set by an increased risk of a stand-replacing fire (see wildfire analysis). A stand-replacing fire has the potential to greatly reduce owl habitat.

Alternatives B, C and F: The effects outlined for Alternative A apply to the action alternatives as well with the following differences. Under Alternative F, no suitable flammulated owl habitat would be harvested. Design features of action alternatives would ensure that no flammulated owl suitable habitat would be harvested. Effects to canopies under Alternatives B and C would be similar to the effects caused by the beetle-related tree mortality (described under Alternative A). The selective harvest would have similar impacts as Alternative A except for reduced snag densities in the action alternatives. Four snags retained per acre in dry habitat types would ensure sufficient snags for the flammulated owl.

Dry ponderosa pine/Douglas-fir ecosystems that provide habitat for the flammulated owl are maintained by fire over time. Excluding fire from the ecosystem could ultimately reduce flammulated owl habitat. Alternative F would reintroduce fire into the ecosystem. It appears that there are short term impacts to the flammulated owl with the implementation of this alternative, similar to those in alternatives B and C. However, the species would benefit over the long term from the reintroduction of fire. There would be no additional effects to flammulated owl habitat outside of harvest units due to underburning.

Alternative D: The effects outlined for Alternative A apply to this alternative as well with the following differences. Design features of action alternatives would ensure that no flammulated owl suitable habitat would be harvested. In this alternative there would be approximately 2 acres of capable habitat selectively harvested that would reduce potential flammulated owl habitat beyond the effects of beetle-related tree mortality. The selective harvest would have similar impacts as the no action except for reduced snag densities in the action alternatives. Four snags retained per acre in dry habitat types would ensure sufficient snags for the flammulated owl. Thinning of the older capable ponderosa pine stands would trend these stands toward an increase in the amount of suitable flammulated owl habitat.

Alternative E: The effects outlined for Alternative A apply to this alternative as well with the following differences. There would be approximately 48 acres of capable habitat selectively harvested that would set back potential flammulated owl habitat beyond the effects of beetle-related tree mortality. The selective harvest would have similar impacts as the no action except for reduced snag densities in the action alternatives. Four snags retained per acre in dry habitat types would ensure sufficient snags for the flammulated owl.

Cumulative Effects

Based on past reductions of suitable habitat from harvest activities, the cumulative effects are considered high. There would be slight negative impacts with the proposed project activities. Under Alternatives D and F, there may be minor improvements of the flammulated owl habitat. There would be slight additional cumulative effects due to this project. Capable habitat harvested would have sufficient canopy closure for the owl within the next 20 years.

Coeur d'Alene Lake North Analysis Area

Historically, the project area provided optimal flammulated owl habitat. Currently, there are approximately 12,120 acres of capable flammulated owl habitat, of which 339 acres are identified as suitable habitat. The remaining capable habitat could provide habitat for the flammulated owl in the future. Due to past harvest, the cumulative effects analysis shows that the amount of remaining habitat is of utmost importance for maintaining flammulated owls. There has also been a loss of snags along open roads. Based on monitoring, the snag levels in the Alder Creek drainage are considerably low due to past harvest.

Direct and Indirect Effects

Alternative A: The same effects to the flammulated owl outlined for the Hayden analysis area apply to Coeur d'Alene Lake North analysis area with the following differences. Under Alternative A, trees would die within the stands of suitable and capable habitat. Because of current canopies and predictions for mortality within these stands, 108 acres of capable habitat would require a longer period of time before providing habitat for the flammulated owl. Suitable stands would continue to provide habitat for the flammulated owl despite some beetle-related tree mortality.

Alternative B, C and F: The effects outlined for Alternative A apply to the action alternatives as well, with the following differences. Design features of action alternatives would ensure that no flammulated owl suitable habitat would be harvested. In each of these alternatives there would be approximately 21 acres of capable

habitat selectively harvested that would reduce potential flammulated owl habitat beyond the effects of beetle-related tree mortality. The selective harvest would have similar impacts as the no action except for reduced snag densities in the action alternatives. Four snags retained per acre in dry habitat types would ensure sufficient snags for the flammulated owl.

Dry ponderosa pine/Douglas-fir ecosystems that provide habitat for the flammulated owl are maintained by fire over time. Excluding fire from the ecosystem could ultimately reduce flammulated owl habitat. Alternative F would reintroduce fire into the ecosystem. It appears that there are short term impacts to the flammulated owl with the implementation of this alternative, similar to those in alternatives B and C. However, the species would benefit over the long term. There would be no additional effects to flammulated owl habitat in alternative F outside harvest units due to under burning.

Alternative D: In this alternative there would be approximately 7 acres of capable habitat selectively harvested that would reduce potential flammulated owl habitat beyond the effects of beetle-related tree mortality. The selective harvest would have similar impacts as the no action except for reduced snag densities in the action alternatives. Four snags retained per acre in dry habitat types would ensure sufficient snags for the flammulated owl. Thinning of the older capable ponderosa pine stands would trend these stands toward an increase in the amount of suitable flammulated owl habitat.

Alternative E: In this alternative there would be approximately 5acres of capable habitat selectively harvested that would reduce potential flammulated owl habitat beyond the effects of beetle-related tree mortality. The selective harvest would have similar impacts as the no action except for reduced snag densities in the action alternatives. Four snags retained per acre in dry habitat types would ensure sufficient snags for the flammulated owl.

Cumulative Effects

Due to past harvest and exclusion of fire, there has been a severe decline in flammulated owl habitat (approximately 95%); cumulative effects are high. This proposed project would not alter suitable habitat, or have effects in the older capable stands that differ from the no action (except F and D) . Thinning in ponderosa pine stands in Alternative D and burning under Alternative F may trend the habitat towards a more historic condition for this species. Future proposed sales may alter approximately 4 acres of suitable habitat, and more acres of older capable habitat. Although there are only slight additional cumulative effects from this project, based on past and foreseeable projects, cumulative effects are high.

Coeur d'Alene Lake South Analysis Area

Historically, the project area provided optimal flammulated owl habitat. Currently, there are 260 acres of suitable habitat. Capable habitat in the area could provide habitat for the flammulated owl in the future.

Direct and Indirect Effects

Alternative A: The same effects to the flammulated owl outlined for the Hayden analysis area apply to Coeur d'Alene Lake South analysis area with the following difference. Under Alternative A, trees would die within the stands of suitable and capable habitat. Because of current canopies and predictions for mortality within these stands, 166 acres of capable habitat would no longer provide habitat for the flammulated owl.

Alternative B, C and E: The effects outlined for Alternative A apply to the action alternatives as well with the following differences. Design features of action alternatives would ensure that no flammulated owl suitable habitat would be harvested. In all of these alternatives there would be approximately 13 acres of capable habitat selectively harvested that would reduce potential flammulated owl habitat beyond the effects of beetle-related tree mortality (Alternative A) . The selective harvest would have similar impacts as the no

action except for reduced snag densities in the action alternatives. Four snags retained per acre in dry habitat types would ensure sufficient snags for the flammulated owl.

Alternative D: In this alternative there would be approximately 16 acres of capable habitat selectively harvested that would reduce potential flammulated owl habitat beyond the effects of beetle-related tree mortality. The selective harvest would have similar impacts as the no action except for reduced snag densities in the action alternatives. Four snags retained per acre in dry habitat types would ensure sufficient snags for the flammulated owl. Thinning of the older capable ponderosa pine stands would trend these stands toward an increase in the amount of suitable flammulated owl habitat.

Alternative F: Effects of alternative F upon flammulated owl habitats are the same as in alternative A.

Cumulative Effects

Based on past activities, cumulative effects are high. This project would not affect suitable or older capable habitat. Under Alternative D, there would be a minor to moderate improvement by thinning in stands with prescriptions for management of flammulated owl. Burning under Alternative F would result in a minor improvement in the older stands of capable habitat.

Chain Lakes Analysis Area

No sightings of flammulated owls within the Chain Lakes Analysis Area have been documented. Dry habitat types found within the area do provide habitat for the flammulated. There are currently 3,560 acres of capable flammulated owl habitat in the analysis area, of which 180 acres are identified as suitable flammulated owl habitat. Most of these suitable habitats are found in the Lake Creek and Cottonwood Creek drainages. There are another that are not currently providing habitat.

Direct and Indirect Effects

Alternative A: The effects to flammulated owls in the Hayden analysis area apply to the Chain Lakes analysis area with the following differences. Under Alternative A, trees would die within the stands of suitable and capable habitat. Because of current canopies and predictions for mortality within these stands, nine acres of suitable habitat and 263 acres of capable habitat would no longer provide habitat for the flammulated owl.

Alternatives B, C and E: The effects outlined for Alternative A apply to the action alternatives as well with the following differences. Design features of action alternatives would ensure that no flammulated owl suitable habitat would be harvested. Only 2 acres of selective harvest would reduce canopies beyond the effects that would occur under Alternative A. The selective harvest would have similar impacts as the no action except for reduced snag densities in the action alternatives. Four snags retained per acre in dry habitat types would ensure sufficient snags for the flammulated owl.

Alternative D: The effects of alternative D on the flammulated owl are similar to those in alternative A. However, there would be some loss of snags and potential nest trees in this alternative that would not occur under alternative A.

Alternative F: Under Alternative F, no suitable flammulated owl habitat would be harvested. However, the dry ponderosa pine/Douglas-fir ecosystems that provide habitat for the flammulated owl are maintained by fire over time. Excluding fire from the ecosystem could ultimately reduce flammulated owl habitat. This alternative reintroduces fire into the ecosystem. There would be a reduction of 39 acres of flammulated owl capable habitat beyond the effects of beetle-related tree mortality (Alternative A) under this alternative. This alternative would result in the greatest loss of potential nest trees of all the alternatives. However, the species would benefit over the long term. There would be additional effects to flammulated owl habitat in alternative F outside harvest units due to under burning. Effects are anticipated to be similar to results due

to beetle-related tree mortality except on acres that are to be underburned. On these 39 acres outside the harvest units, canopies would be reduced in capable habitat for the flammulated owl. It is anticipated that it would at least be 20 years before the burned units would again provide suitable habitat.

Cumulative Effects

Past activities have severely reduced flammulated owl habitat. Cumulative effects are high due to a reduction in flammulated habitat from past harvest and from development on private lands. This project would result in minor impacts to flammulated owl habitat. In the long-term, Alternatives D and F would slightly to moderately improve the habitat.

Steamboat Analysis Area

There is no suitable habitat for the flammulated owl within this analysis area. There are 837 acres of capable flammulated owl habitat which may provide habitat in 50 to 100 or more years.

All Alternatives

Direct and Indirect Effects: There would be no change in the canopies of capable flammulated owl habitat under any of the alternatives. Capable stands would provide suitable flammulated owl habitat over the long term.

Cumulative Effects: There would be no additional cumulative effects as a result of proposed activities. Past harvest, and development on private lands, have resulted in moderate cumulative effects.

Bumblebee Analysis Area

The Bumblebee area does not provide optimal habitat for the flammulated owl. The predominately moist habitat types in the area are not preferred by the owl. Currently there are 86 acres of suitable habitat within the analysis area. There is a total of 1,564 acres of capable habitat that could provide habitat for the flammulated owl at some point in the future.

Direct and Indirect Effects: Alternative design features ensure that no suitable flammulated owl habitat would be harvested. Canopy would be reduced on 18 acres of capable habitat under all alternatives, including the No Action. Maintaining a minimum of 4 snags per acre would also increase the likelihood that flammulated owls could continue to use the area. Over time, capable habitat will provide suitable habitat for flammulated owls.

Cumulative Effects: Due to severe reductions in suitable habitat due to past activity, cumulative effects are high. Approximately 97% of the flammulated owl habitat that was found in the basin historically has been lost. All alternatives, including the no action, would have an additional minor effect on flammulated owl habitat.

Hart Analysis Area

The Hart analysis area provides approximately 1,112 acres of dry site habitat which could provide habitat. At the present time none of this is suitable.

Direct and Indirect Effects: Under all alternatives, including Alternative A, there would be a change of 11 acres from the existing condition in flammulated owl habitat.

Cumulative Effects: Past harvest has caused a moderate decline in suitable habitat. Ongoing or foreseeable sales propose altering 50 acres of suitable habitat. The proposed project under Alternatives B, C, D, E and G

would have minor effects. Alternative F would have moderate effects because of the reduction in canopy caused by underburning. Cumulatively, Alternative F has high effects. When considered in combination with past high effects, cumulative effects for the other alternatives would be considered moderate.

NORTHERN GOSHAWK

The following sections analyze the effects of the alternatives on northern goshawks and their habitat using the indicators documented earlier in this chapter. Table III-97 displays the acres of capable and suitable habitat remaining after the proposed treatments for each alternative. In addition to the indicators for effect the discussions also documents the consideration of other potential effects as appropriate.

There have been changes in the acres of capable and suitable goshawk habitat displayed in the Draft EIS because of refinements/improvements made to the query for suitable goshawk habitat. During development of the Draft EIS, information on the effects of the beetle-related tree mortality upon goshawk habitat was not complete. In addition, some habitat types were overlooked that would provide additional goshawk habitat. Review of goshawk habitat found that in some proposed regeneration units, beetle activity would reduce the canopy to a level below that which is used by goshawk. For the Final EIS, alternatives were modified to include proposed regeneration harvest in goshawk habitat. Please refer to the tables and maps in the Project Files ("Wildlife," goshawk) for additional information regarding the analysis.

For analysis purposes on the Coeur d'Alene River Ranger District, because of the low level of existing suitable habitat in some Analysis Areas, goshawk assessment areas were delineated within each Analysis Area. These assessment areas approximate hypothetical territories (USDA Forest Service, 1990). The areas were delineated based on subdrainage boundaries, capable habitat, typical territory sizes in the northern Rockies (5,000 to 6,000 acres), and National Forest System land within the subdrainages. Stands and acres impacted were compared to existing suitable nesting habitat (including stand size and distribution) to determine the effects on goshawk suitable habitat at the scale of approximate home ranges. Refer to the text for details on individual analysis areas.

Effects Common to All Analysis Areas

Stands proposed for regeneration harvest would lose existing canopy closure due to beetle activity under the No-Action Alternative. Analysis found that this reduction in canopy closure from the beetle activity would result in some stands becoming unsuitable goshawk nesting habitat and that regeneration harvest in these stands would not add to the loss of suitable acres.

In most cases units proposed for selection harvest under all action alternatives would not impact suitable goshawk habitat beyond the effects from the bark beetle. Live canopy closure would vary little from the No-Action Alternative. Habitat would still be usable by implementing the design feature for snags and downed woody material for soil productivity. Those stands that would be impacted by management activity are included in the calculations displayed in Table III-97. Should an active nest be located during implementation of project activities, appropriate mitigation measures would be applied to avoid effects to the nest (please refer to the discussion of mitigation measures in Chapter II).

Under Alternative D, commercial thinning of ponderosa pine and western larch would alter the canopy closure to a level not usable by the goshawk. However, open stands of these drier habitat types are in short supply, and treatment would benefit other wildlife species (e.g. flammulated owl). Therefore, treatments in these stands are an opportunity to trend towards historical conditions, as recommended in the Geographic Assessment for the Coeur d'Alene River Basin (USDA Forest Service, 1998) and still maintain adequate levels of goshawk habitat in the analysis areas.

Table III-97. Changes in northern goshawk habitat, by alternative.

Analysis Area	Existing	Alt. A	Alts. B & C	Alt. D	Alt. E	Alt. F	Alt. G
Hayden (37,575 acres)							
Capable Habitat	6,160	6,160	6,160	6,160	6,160	6,160	6,160
Suitable Habitat	1,253	1,157	1,136	1,112	1,149	1,136	1,148
% of Existing		92	91	89	92	91	92
% of No Action			98	96	99	98	99
Chain Lakes (53,007 acres)							
Capable Habitat	6,083	6,083	6,083	6,083	6,083	6,083	6,083
Suitable Habitat	1,977	1,851	1,846	1,846	1,846	1,846	1,851
% of Existing		94	93	93	93	93	94
% of No Action			99	99	99	99	100
CdA Lake North (67,724 a)							
Capable Habitat	18,624	18,624	18,624	18,624	18,624	18,624	18,624
Suitable Habitat	7,301	6,816	6,719	6,625	6,717	6,719	6,788
% of Existing		93	92	91	92	92	93
% of No Action			99	97	99	99	99
CdA Lake South (48,426 a)							
Capable Habitat	12,063	12,063	12,063	12,063	12,063	12,063	12,063
Suitable Habitat	3,454	3,224	3,219	3,211	3,219	3,224	3,224
% of Existing		93	93	93	93	93	93
% of No Action			99	99	99	100	100
Bumblebee (14,098 acres)							
Capable Habitat	3,907	3,907	3,907	3,907	3,907	3,907	3,907
Suitable Habitat	1,334	1,330	1,330	1,330	1,330	1,330	1,330
% of Existing		99	99	99	99	99	99
% of No Action			100	100	100	100	100
Steamboat (8,803 acres)							
Capable Habitat	2,432	2,432	2,432	2,432	2,432	2,432	2,432
Suitable Habitat	699	699	699	699	699	699	699
% of Existing		100	100	100	100	100	100
% of No Action			100	100	100	100	100
Hart (23,370 acres)							
Capable Habitat	3,196	3,196	3,196	3,196	3,196	3,196	3,196
Suitable Habitat	371	371	371	371	371	371	371
% of Existing		100	100	100	100	100	100
% of No Action			100	100	100	100	100
Totals							
Capable Habitat	52,465	52,465	52,465	52,465	52,465	52,465	52,465
Suitable Habitat	16,389	15,448	15,320	15,194	15,331	15,325	15,393

Under all alternatives, reasonably foreseeable actions would occur which would impact suitable goshawk habitat. These actions include timber harvest in the Horizon Moon Timber Sale and the Huckleberry Ice Salvage Sale within the Coeur d'Alene North Analysis Area. These sales would impact approximately 65 acres of suitable habitat. Other foreseeable projects do not vegetatively impact suitable goshawk habitat. Foreseeable actions are also scheduled which would close, restrict, or otherwise reduce potential disturbance to nesting goshawks. These impacts are discussed under the appropriate analysis area. There is no direct measurable benefit to goshawks from the actions affecting disturbance.

Some loss of canopy cover would occur due to mortality from bark beetles. Generally, because northern goshawks require a high level of canopy closure, a reduction to below 50% canopy cover would remove stands from nesting suitability. Stands with interspersed standing live trees, would still function as foraging

habitat. Those stands in which canopy closure remained above 50% would remain suitable nesting and foraging habitat (USDA Forest Service, 1990).

Analysis indicates that under all alternatives Douglas-fir beetles would reduce canopy closure in existing suitable habitat below levels used by goshawk for nesting on approximately 876 acres. Bark beetles would impact suitable nesting habitat in one goshawk assessment area in the Coeur d'Alene North Analysis Area to the extent that there could be a loss of the theoretical ability of that assessment area to support a breeding pair of goshawks.

Because of the level of existing suitable habitat in some Analysis Areas on the Coeur d'Alene River Ranger District, all action alternatives were developed (through design features and/or unit location and treatments) to avoid impacts from management activity in suitable goshawk nesting habitat to the extent practicable. Because of other resource objectives and mapping/analysis techniques, minor impacts to suitable habitat from management activities do occur. Although the analysis indicates minor additional impacts (compared to the No Action alternative), there would be little loss of suitable nesting habitat from proposed management activity and no affect from management activities on the ability of any goshawk assessment area to support goshawks.

Hayden Analysis Area

The Hayden Analysis Area consists of approximately 6,160 acres of capable goshawk habitat, of which 1,253 currently is classified as suitable habitat. In general, the suitable nesting habitat is scattered within the analysis area in relatively small patch sizes and size/distribution is not optimal. In 1993, three immature goshawks were sighted within the Analysis Area. There are no known nest sites.

For analysis purposes the Hayden Analysis Area was delineated into six goshawk assessment areas. An analysis of suitable habitat on National Forest System lands indicates that even though suitable stands are relatively small and scattered, five of these assessment areas currently contain sufficient suitable habitat to support goshawks. The range of suitable habitat in assessment areas with sufficient habitat varies from 177 acres to 273 acres. The area which does not contain sufficient habitat contains approximately 77 acres of suitable habitat in four blocks, all less than 25 acres in size.

Alternative A

Direct and Indirect Effects: Alternative A would result in a change in suitable nesting habitat (due to bark beetle-related tree mortality) from 1,253 acres to 1,157 acres or a loss of 8% of current suitable habitat. This loss of habitat would not result in any goshawk assessment area dropping below levels and distribution of suitable nesting habitat which could support a breeding pair of goshawks. The increased number of snags available would increase prey density.

The increased fire risk associated with this alternative would increase the risk of stand replacing fire; which in turn could lead to an unpredictable loss of suitable habitat.

Due to foreseeable actions 0.8 miles of existing open road would be closed and there would be a reduction in open road density from the existing 1.4 to 1.3 miles per square mile of area. An additional 7.3 miles of existing gated road would receive improved closures (such as earth barriers or obliteration).

Cumulative Effects: Past actions in this analysis area have resulted in a moderate to high cumulative reduction in habitat for this species. However, based on the availability of nesting habitat the Hayden analysis area contains sufficient habitat to support five pair of nesting goshawks. The effects on suitable habitat from bark beetle-related tree mortality when added to existing and foreseeable effects would be considered moderate; and the capability of the area to support goshawks at existing levels would not be affected.

Effects Common to Alternatives B through G

Direct and Indirect Effects: The effects documented for Alternative A apply to Alternatives B through G, with the following differences. This led to very similar effects on suitable habitat. These alternatives result in a range of acres of suitable habitat being impacted due to management activity, from 8 acres under Alternative E to 45 acres under Alternative D (see Table III-97). These impacts are in addition to the impacts displayed for Alternative A. The consequences on the availability of suitable habitat and the ability of the analysis area to support goshawks are essentially the same as the No Action Alternative.

Indirect effects due to the risk of a stand-replacing fire would be reduced within the stands treated because of the removal of the huge quantities of fuel loading. The difference between alternatives is dependent on the amount and location of acres being treated in each alternative. The treatment would bring many stands closer to their historical conditions with regards to forest floor fuels, and would likely be similar to what northern goshawks are adapted to in this area. Fires that did occur would be more likely to be lower intensity fires, which often increase the value for several species of wildlife. Grouse and snowshoe hare are species which would be favored by more frequent, low intensity fires, and both are locally important prey species for northern goshawk. Snowshoe hares are more available to predation by goshawks in more open stands, even though they do not reach their greatest abundance in these types of conditions.

The marking of 4 to 6 snags per acre (depending on habitat type) well-distributed throughout the habitat would further ensure future use by goshawks.

Disturbance at nest sites is a possibility in any timber harvesting operation or management activity during nesting season. There are no known nest sites; if nests are found prior to or during implementation, design features to protect nesting goshawks would be implemented. Consequently, the potential of nest site disturbance would be minor.

The closure of approximately 2.2 miles of road would not result in a measurable reduction in open road densities from what would occur under the No-Action Alternative. These closures and improvements in existing closures on approximately 24.5 miles of road in these alternatives could indirectly benefit goshawks by reducing the potential for human disturbance during nesting season.

Cumulative Effects: The effects on suitable habitat under all action alternatives when added to the bark beetle-related tree mortality and existing and foreseeable effects would be considered moderate; and the capability of the area to support goshawks at existing levels would not be affected.

Alternative B

The effects outlined for all action alternatives apply to Alternative B with the following differences.

Because this alternative treats only those outbreaks currently known and not additional beetle infested stands (identified in Alternative D), the effects of Alternative B would have elements of the No Action Alternative for those stands not treated but subsequently infested. The degree that this could affect goshawks depends in large part on the location and intensity of future hits.

Alternative C

This alternative would have the same direct, indirect, and cumulative effects to northern goshawk as all action alternatives and Alternative B, except for the following differences. Because fewer roads would be constructed, there would be less disturbance from ground-based vehicles. This would be replaced by the disturbance from helicopter logging. Helicopters can cause abandonment at nest sites even if the habitat at the site is not altered, but may be reoccupied in subsequent years (pers. comm. with S. Jacobson, 1998).

Alternative D

This alternative would have the same direct, indirect, and cumulative effects to northern goshawk as all action alternatives, except for the following differences. The additional road construction/reconstruction in this alternative increases the potential for disturbance. However, given the lack of known nests and design or mitigation features (e.g. closure of new roads and protection of nests) the potential for disturbance would be considered minor. Individuals are not likely to be affected.

Alternative E

This alternative would have the same direct, indirect, and cumulative effects to northern goshawk as all action alternatives and Alternative B, except for the following differences. Some underburning in suitable habitat occurs under this alternative. However, this does not add any measurable effects beyond that attributable to harvest. The determination of effect would remain the same.

Alternative F

This alternative would have the same direct, indirect, and cumulative effects to northern goshawk as all action alternatives and Alternative B.

Alternative G

This alternative would have the same direct, indirect, and cumulative effects to northern goshawk as all action alternatives, except for the following differences. The effects on suitable habitat displayed in Table III-97 for this alternative result from burning. There is no need to mark snags for retention in this alternative.

Coeur d'Alene Lake North Analysis Area

The same effects to the northern goshawk outlined for the Hayden Analysis Area apply to the Coeur d'Alene Lake North analysis area with the following differences.

The Coeur d'Alene Lake North Analysis Area consists of approximately 18,624 acres of capable goshawk habitat, of which 7,301 currently is classified as suitable habitat. Much of the suitable habitat occurs in relatively large blocks. The analysis area was delineated into 11 goshawk assessment areas. An analysis of suitable habitat on National Forest System administered lands indicates that ten of these assessment areas currently contain sufficient suitable habitat to support goshawks. The area which does not contain sufficient habitat is comprised primarily of non-National Forest System administered lands on which information regarding suitable habitat is not available; there are only approximately 49 acres of suitable habitat on National Forest System lands in this assessment area. The range of suitable habitat in assessment areas with sufficient habitat varies from 116 acres (in 3 blocks) to 1,364 acres.

Alternative A

Direct and Indirect Effects: This alternative would have the same direct and indirect effects to northern goshawks as described for the Hayden analysis area with the following differences.

Alternative A would result in a change in suitable nesting habitat from 7,301 acres to 6,816 acres, or a loss of 6% of current suitable habitat. This loss of 485 acres (420 acres from bark beetle and 65 acres from foreseeable actions) is distributed in the analysis areas so that the goshawk assessment area with only 116 acres of suitable habitat would drop below the level and distribution of suitable nesting habitat required to support a breeding pair of goshawks. This affect on the assessment area is due to bark beetle-related tree mortality, not the 65 acres attributable to foreseeable timber harvest. This assessment area - like the area which currently does not contain sufficient habitat - is comprised primarily of non-National Forest System administered lands.

Due to foreseeable actions approximately 6.4 miles of existing open road would be closed and there would be a reduction in open road density from the existing 1.4 to 1.3 miles per square mile of area. An additional 3.5 miles of road would receive improved closures (e.g. earth barriers or obliteration).

Cumulative Effects: The effects of the no action alternative combined with the effects from past management activity results in a moderate reduction in habitat for this species. However, based on the availability of nesting habitat, the Coeur d'Alene North analysis area contains sufficient habitat to support 9 pair of nesting goshawks. It is recommended that suitable habitat for a minimum of one pair of goshawks be provided within each approximate 10,000 acres area (USDA Forest Service 1990). With habitat provided for 9 pairs within the 67,724 acres analysis area, the Coeur d'Alene North analysis area is consistent with this recommendation for providing suitable habitat. The loss of the capability of one assessment area to support nesting goshawks would not affect the capability of the area to support goshawks at recommended levels.

Action Alternatives

The effects described by alternative in the Hayden Analysis Area also apply to the corresponding alternatives in the Coeur d'Alene Lake North Analysis Area; and the effects described for Alternative A in the Coeur d'Alene Analysis area apply to each alternative, with the following differences.

Alternatives B through G

Direct and Indirect Effects: The effects documented for Alternative A apply to these action alternatives with the following differences. These alternatives result in a range of acres of suitable habitat being impacted due to management activity - from 99 acres (less than 1% of current suitable habitat) under Alternative E to 199 acres (3% of current suitable habitat) under Alternative D (see Table III-97). These impacts are in addition to the impacts displayed for Alternative A. The consequences on the availability of suitable habitat and the ability of the analysis area to support goshawks are essentially the same as the No Action Alternative.

These alternatives would result in open road densities being reduced from the existing 1.4 to 1.3. The improvements in existing closures (obliteration) on approximately 37.5 miles of road could indirectly benefit goshawks by reducing the potential for human disturbance during nesting season. There are no closures of existing open roads.

Cumulative Effects: The effects on suitable habitat under all of these action alternatives when added to the bark beetle-related tree mortality and existing and foreseeable effects would be considered moderate. With habitat provided for 9 pairs within the 67,724 acres analysis area habitat provided in the Coeur d'Alene analysis area is consistent with the recommendation for providing suitable habitat (USDA Forest Service 1990). The loss of the capability of one assessment area to support nesting goshawks would not affect the capability of the larger area to support goshawks at recommended levels.

Alternative B

The effects outlined for Alternative B in the Hayden Analysis Area and all action alternatives in the Coeur d'Alene North Analysis Area apply to Alternative B, with the following differences.

Improvements in existing closures on approximately 30.5 miles of road could indirectly benefit goshawks by reducing the potential for human disturbance during nesting season.

Alternative C

The effects outlined for Alternative C in the Hayden Analysis Area and all action alternatives in the Coeur d'Alene North Analysis Area apply to Alternative C with the following differences.

The improvements in existing closures on 30.5 miles of road in this alternative (there are no closures of existing open roads) could indirectly benefit goshawks by reducing the potential for human disturbance during nesting season.

Alternative D

The effects outlined for Alternative D in the Hayden Analysis Area and all action alternatives in the Coeur d'Alene North Analysis Area apply to Alternative D.

The improvements in existing closures on 32.5 miles of road in this alternative (there are no closures of existing open roads) could indirectly benefit goshawks by reducing the potential for human disturbance during nesting season.

Alternative E

The effects outlined for Alternative E in the Hayden Analysis Area and all action alternatives in the Coeur d'Alene North Analysis Area apply to Alternative E.

The improvements in existing closures on 30.5 miles of road in this alternative (there are no closures of existing open roads) could indirectly benefit goshawks by reducing the potential for human disturbance during nesting season.

Alternative F

Alternative F would have the same direct, indirect, and cumulative effects to northern goshawk as all action alternatives and Alternative B.

Improvements in existing closures on approximately 30.5 miles of road could indirectly benefit goshawks by reducing the potential for human disturbance during nesting season.

Alternative G

The effects outlined for Alternative G in the Hayden Analysis Area and all action alternatives in the Coeur d'Alene North Analysis Area apply to Alternative G.

The improvements in existing closures on 30.5 miles of road in this alternative (there are no closures of existing open roads) could indirectly benefit goshawks by reducing the potential for human disturbance during nesting season.

Coeur d'Alene Lake South Analysis Area

The same effects to the northern goshawk outlined for the Hayden Analysis Area apply to the Coeur d'Alene Lake South analysis area with the following differences.

The Coeur d'Alene Lake South Analysis Area consists of approximately 12,063 acres of capable goshawk habitat, of which 3,454 currently is classified as suitable habitat. Much of the suitable habitat occurs in relatively large blocks. The analysis area was delineated into 3 goshawk assessment areas; all assessment areas contain sufficient suitable nesting habitat to support a breeding pair of goshawks. The range of suitable habitat in assessment areas varies from approximately 685 acres to 1,307 acres.

In 1998, an active goshawk nest within the Analysis Area was located.

Alternative A

Direct and Indirect Effects: Alternative A would result in a change in suitable nesting habitat from 3,454 acres to 3,224 acres, or a loss of 7% of current suitable habitat. This loss of 230 acres is distributed in the analysis areas so that no goshawk assessment area drops below the level and distribution of suitable nesting habitat required to support a breeding pair of goshawks

Due to foreseeable actions approximately 11.9 miles of existing open road would be closed and there would be a reduction in open road density from the existing 1.9 to 1.6 miles per square mile of area.

Cumulative Effects: The effects of the no action alternative combined with the effects from past management activity results in a moderate reduction in habitat proportionate to the amount of suitable habitat remaining. The effects on suitable habitat from bark beetle-related tree mortality when added to existing and foreseeable effects would be considered moderate; and the capability of the area to support goshawks at existing levels would not be affected.

Effects by Alternative

The effects described by alternative in the Hayden Analysis Area apply to each alternative in the Coeur d'Alene Lake South Analysis Area, with the following differences.

Alternatives B through G

Direct and Indirect Effects: The effects documented for Alternative A apply to these action alternatives with the following differences. The action alternatives result in a range of acres of suitable habitat being impacted due to management activity - from 0 acres in alternatives F and G to 13 acres in alternative D (less than 1% of current suitable habitat). These impacts are in addition to those displayed for Alternative A. The consequences on the availability of suitable habitat and the ability of the analysis area to support goshawks are essentially the same as the No Action Alternative.

There are no activities planned near the active goshawk nest and there would be no effects on the nest site or post fledging area.

Cumulative Effects: Past harvest activity has resulted in moderate cumulative effects. The effects on suitable habitat and potential disturbance under all of these action alternatives when added to the bark beetle-related tree mortality and existing and foreseeable effects would be considered moderate; and the capability of the area to support goshawks at existing levels would be retained.

Effects by Alternative

The effects described by alternative in the Hayden Analysis Area apply to each alternative in the Coeur d'Alene South Analysis Area, with the following differences.

Alternative B, C, D, E, and G

The closure of approximately 12.4 miles of road under these alternatives (beyond what would occur under Alternative A) would result in a decrease from open road densities under the No-Action Alternative (from 1.6 to 1.24 miles per square mile of area). These closures and improvements in existing closures on approximately 10.9 miles of road under these alternatives (beyond what would occur under Alternative A) could indirectly benefit goshawks by reducing the potential for human disturbance during nesting season.

Alternative F

The closure of approximately 6.2 miles of road would result in open road densities being reduced from what would occur under the No-Action Alternative (from 1.6 to 1.4 miles per square mile of area). These closures and improvements in existing closures on approximately 3.9 miles of road in this alternative could indirectly benefit goshawks by reducing the potential for human disturbance during nesting season.

Chain Lakes Analysis Area

The same effects to the northern goshawk outlined for the Hayden Analysis Area apply to the Chain Lakes analysis area with the following differences.

The Chain Lakes Analysis Area consists of approximately 6,083 acres of capable goshawk habitat, of which 1,977 currently is classified as suitable habitat. Much of the suitable habitat occurs in relatively large blocks. The analysis area was delineated into 4 goshawk assessment areas; all assessment areas contain sufficient suitable nesting habitat to support a breeding pair of goshawks. The range of suitable habitat in assessment areas varies from approximately 174 acres to 612 acres.

There is one active goshawk nest site just west of the Analysis Area. Its territory most likely includes a portion of the Chain Lakes Analysis Area. There was a goshawk nest identified in 1992 within the analysis area, but the current status is unknown. Most of the suitable habitat is located in the Lake Creek drainage.

Alternative A

Direct and Indirect Effects: Alternative A would result in a change in suitable nesting habitat from 1,977 acres to 1,851 acres, or a loss of 6% of current suitable habitat. This loss of 126 acres is distributed in the analysis areas so that no goshawk assessment area drops below the level and distribution of suitable nesting habitat required to support a breeding pair of goshawks

Due to foreseeable actions, approximately 19.1 miles of existing open road would be closed and there would be a reduction in open road density from 2.3 to 1.6 miles per square mile of area.

Cumulative Effects: The effects of the no action alternative combined with the effects from past management activity results in a moderate reduction in habitat proportionate to the amount of suitable habitat remaining. The effects on suitable habitat from bark beetle-related tree mortality when added to existing and foreseeable effects would be minor; and the capability of the area to support goshawks at existing levels would not be affected.

Effects by Alternative

The effects described by alternative in the Hayden Analysis Area apply the each alternative in the Chain Lakes Analysis Area, with the following differences.

Alternatives B through G

Direct and Indirect Effects: The effects documented for Alternative A apply to these action alternatives with the following differences. There would be similar effects for all of these action alternatives, ranging from no acres of suitable habitat being impacted due to management activity under Alternative G to 5 acres being impacted under Alternatives B through F (less than 1% of current suitable habitat). These impacts would be in addition to those displayed for Alternative A. The consequences on the availability of suitable habitat and the ability of the analysis area to support goshawks are essentially the same as under the No-Action Alternative. None of the alternatives have harvest within the territory of the known nest sites.

Cumulative Effects: Past activity has caused a moderate decline in the suitable habitat. The effects on suitable habitat under all of these action alternatives when added to the bark beetle-related tree mortality and existing and foreseeable effects would be minor; and the capability of the area to support goshawks at existing levels would be retained.

Alternative B, C, D, E and F

The closure of approximately 14.5 miles of road under Alternatives B through E would result in open road densities being reduced from what would occur under the No-Action Alternative (from 1.6 to 1.0 miles per square mile of area). Under Alternative F, fewer roads would be closed, so open road densities would be reduced to 1.3 miles per square mile of area. These closures and improvements in existing closures on approximately 6.2 miles of road in these alternatives could indirectly benefit goshawks by reducing the potential for human disturbance during nesting season.

Alternative G

The closure of approximately 24.9 miles of road would result in open road densities being reduced from what would occur under the No-Action Alternative (from 1.6 to 0.9 miles per square mile of area. The closures and improvements in existing closures on approximately 6.2 miles of road in these alternatives could indirectly benefit goshawks by reducing the potential for human disturbance during nesting season.

Steamboat Analysis Area

The same effects to the northern goshawk outlined for the Hayden Analysis Area apply to the Steamboat analysis area with the following differences.

The Steamboat Analysis Area consists of approximately 2,432 acres of capable goshawk habitat, of which 699 currently is classified as suitable habitat. The analysis area was delineated into 2 goshawk assessment areas; both of which contain sufficient suitable nesting habitat to support a breeding pair of goshawks. The range of suitable habitat in assessment areas varies from approximately 290 acres to 408 acres.

The Steamboat Analysis Area provides the dense canopies required by the Northern goshawk, however many stands are fragmented by adjacent younger age stands. Historically, the presence of large trees provided habitat for the goshawk and they most likely used the area. There have been no reported sightings of goshawks in the area. Goshawk surveys completed in 1993 in the Indian-Barrymore drainages did not reveal the presence of goshawks. Just north of the area, the Can Creek drainage provides a large block of mature forest and the most suitable habitat for goshawk.

Effects by Alternative

The effects described by alternative in the Hayden Analysis Area apply to each alternative in the Steamboat Analysis Area, with the following differences.

All Alternatives

Direct and Indirect Effects: Under all alternatives suitable stands that may be infested with Douglas-fir beetle could lose some canopy cover. However, percent canopy cover would remain sufficient to provide habitat for the goshawk; and there would be no effect on suitable goshawk nesting habitat in any alternative.

Cumulative Effects: Due to past activities, cumulative effects are considered moderate. There is no additional adverse effect from any alternative; and the capability of the area to support goshawks at existing levels would not be affected.

Alternative A, B, C, E, and F

There are no road closures or improvements in existing road closures included in the features of these alternatives and consequently no corresponding indirect benefit for goshawks.

Alternative D

The improvements in existing closures on 4.8 miles of road in this alternative could indirectly benefit goshawks by reducing the potential for human disturbance during nesting season.

Alternative G

The closure of approximately 6 miles of existing open roads under this alternative would reduce open road mile density from 1.7 to 1.0 miles per square mile of area.

Bumblebee Analysis Area

The same effects to the northern goshawk outlined for the Hayden Analysis Area apply to the Bumblebee analysis area with the following differences.

The Bumblebee Analysis Area consists of approximately 3,907 acres of capable goshawk habitat, of which 1,334 currently is classified as suitable habitat. The majority of the suitable goshawk habitat lies between Bumblebee Creek and Little Bumblebee Creek. Much of the suitable habitat occurs in relatively large blocks. The analysis area was delineated into 2 goshawk assessment areas; both of which contain sufficient suitable nesting habitat to support a breeding pair of goshawks. The range of suitable habitat in assessment areas varies from approximately 624 acres to 709 acres.

All Alternatives

Direct and Indirect Effects: All alternatives would result in a change in suitable nesting habitat from 1,334 acres to 1,330 acres (due to mortality from bark beetle activity), or a loss of less than 1% of current suitable habitat. This loss of 4 acres does not result in any goshawk assessment area dropping below the level and distribution of suitable nesting habitat required to support a breeding pair of goshawks

Cumulative Effects: Due to past activities, cumulative effects are considered moderate. The potential loss of 4 acres of suitable nesting habitat from bark beetle-related tree mortality under all alternatives is inconsequential; and the capability of the area to support goshawks at existing levels would be retained.

Alternatives A, B, C, D, E, and F

There are no road closures or improvements in existing road closures included in the features of these alternatives and consequently no corresponding indirect benefit for goshawks.

Alternative G

The closure of approximately 6.4 miles of existing open road in this alternative would reduce the open road mile density from the existing 0.9 to 0.7 miles per square mile of area.

Hart Analysis Area

The same effects to the northern goshawk outlined for the Hayden Analysis Area apply to the Steamboat analysis area with the following differences.

The Hart Analysis Area consists of approximately 3,196 acres of capable goshawk habitat, of which 371 currently is classified as suitable habitat. For analysis purposes the Hart Analysis Area was delineated into 4 goshawk assessment areas, 2 of these assessment areas currently contain sufficient suitable habitat to support goshawks. In the 2 assessment areas with insufficient suitable habitat at this time, most of the capable habitat is considered immature sawtimber and through succession will soon become suitable. The range of suitable habitat in assessment areas with sufficient habitat varies from 159 acres to 211 acres.

Effects by Alternative

The effects described by alternative in the Hayden Analysis Area apply to each alternative in the Hart Analysis Area, with the following differences.

All Alternatives

Direct and Indirect Effects: Under all alternatives suitable stands that may be infested with Douglas-fir beetle could lose some canopy cover. However, percent canopy cover would remain sufficient to provide habitat for the goshawk; and there would be no effect on suitable goshawk nesting habitat in any alternative.

There is no effect on the capable habitat in any assessment area which would affect the future suitability of that habitat (e.g. the immature sawtimber which would succeed to mature). There are no road closures or improvements in existing road closures included in the features of these alternatives and consequently no corresponding indirect benefit for goshawks.

Due to foreseeable actions approximately 4 miles of existing open road would be closed and there would be a reduction in open road density from the existing 1.4 to 1.3 miles per square mile of area. An additional 0.5 mile of existing gated road would receive improved closures (e.g. earth barriers of obliteration).

Cumulative Effects: Due to past activities, cumulative effects are considered moderate. There is no additional effect from any alternative; and the capability of the area to support goshawks at existing levels would not be affected.

Management Indicator Species

ELK

Methodology

Changes were made between publication of the Draft EIS and preparation of the Final EIS, to incorporate foreseeable activity and changes that occurred regarding the transportation plan. In addition, under Alternative D, the Jim Creek Road would be obliterated without leaving a foot trail. This closure type would provide for optimal security for big game.

In Elk Habitat Unit 7, the existing elk habitat potential increased by 2% due to updates in recent road closures through completion of a portion of the Horizon Timber Sale. Changes to the Elk Habitat Unit at the compartment level are documented in the project files ("Wildlife"), with supplemental information regarding the analysis (data used, compartment changes at the Elk Habitat Unit level, and supporting rationale for impact calls).

Elk habitat potential was calculated using the "Guidelines for Evaluating and Managing Summer Elk Habitat in Northern Idaho," (Leege, et al. 1984). "Elk habitat potential" represents the percentage of the maximum potential habitat (100 percent) that is provided to the animal. The elk model uses habitat data to predict the ability of an area to support elk populations. The factors which were used in this model include cover-forage ratios, thermal cover, summer and winter range acres, open roads, gated roads, obliterated and barriered roads, security acres, and cumulative effects of adjacent timber sale and road building activity. Although the elk habitat model does not address elk mortality during hunting season, restrictions would be applied to purchasers during hunting season, as identified in Chapter II ("Features Common to All Alternatives"). For information on open road densities, please refer to the "Fisher" discussions earlier in this chapter.

Elk Habitat Units are made up of several compartments and encompass large areas. For example, Elk Habitat Unit 7 encompasses 50,877 acres and comprises 9 compartments. Subdivisions were identified in Elk Habitat Units 7 and 9 based on information provided for the Horizon timber sales (Horizon Final Environmental Impact Statement and Record of Decision, USDA Forest Service, 1991).

A unit weighted average of all elk habitat units for the Coeur d'Alene River Ranger District was calculated to determine if the Forest Plan standards for elk habitat potential are being met. (The Coeur d'Alene River District was formed by a consolidation of two separate districts, as displayed in the table below.) Currently, the Forest Plan standard is being exceeded. Under the proposed alternatives, there would be a decrease in open road densities and improved road closures in most analysis areas after sale activities are completed (post sale). It is predicted that the post-sale weighted average would increase, and the Forest Plan standard would be met.

Table III-98. District standard and existing unit weighted average elk habitat potential, Coeur d'Alene River Ranger District.

District Area	District standard elk habitat potential (unit weighted average)	Existing elk habitat potential (unit weighted average)
Fernan	48%	52%
Wallace	52%	54%

The existing elk habitat potential for each Elk Habitat Unit within the analysis areas was calculated, including both past and ongoing activities. Elk Habitat Units 7 and 9 had the most substantial amount of proposed activities. Elk habitat potential in these two Elk Habitat Units was analyzed to determine the effects of the Douglas-fir beetle activity and effects after completion of sale activities (post-sale) based on the activities

proposed under Alternative D. Alternative D was used for the analysis because it proposes the most activities of all alternatives. Effects to elk habitat potential under other action alternatives were analyzed based on the amount, location, and timing of proposed activities in relation to the elk habitat potential changes occuring in Elk Habitat Units 7 and 9. The effects are described in terms of anticipated change in elk habitat potential, as described below.

The degree of change to elk habitat potential in each analysis area is based on outcomes of the full analysis of Elk Habitat Units 7 and 9, and on professional judgement, using the following terms and definitions:

Minor *Effects would cause a 0 to 2% change in the elk habitat potential (either positive or negative) when compared to the existing condition.*

Moderate *Effects would cause a 3 to 4% change in the elk habitat potential (either positive or negative) when compared to the existing condition.*

High *Effects would cause a 5% or greater change in the elk habitat potential (either positive or negative) when compared to the existing condition, or would remain below the Forest Plan goal over the long term.*

Table III-99. Existing and Forest Plan goals for elk habitat potential (percent), in Elk Habitat Units (EHU's) and analysis areas of the Coeur d'Alene River Ranger District.

Analysis Area	EHU	Forest Plan Goal	Existing Potential
Hayden, Coeur d'Alene North	9 (Fernan)	38	45
Hayden	10 (Fernan)	44	45
Coeur d'Alene North	7 (Fernan)	42	44
Coeur d'Alene South/Chain Lakes	8 (Fernan)	41	58
Steamboat	6 (Wallace)	28	41
Bumblebee	5 (Fernan)	38	59
Bumblebee	6 (Fernan)	51	45
Hart	7 (Wallace)	33	48
Hart	5 (Wallace)	55	51
Hart	3 (Wallace)	65	56

Effects Common to All Action Alternatives

Roads opened in relation to this project would be gated to restrict public access and avoid the risk of long term established use of the roads. Under all action alternatives, effects of disturbances during sale implementation would be minor to moderate. Under Alternatives B, C, D, and F, regeneration harvests would occur, so that there would be a minor reduction in the amount of hiding cover and an increase in forage. Analysis using aerial photography did not reveal a measurable change in the cover:forage ratios due to either beetle activity or regeneration harvest.

Hayden Analysis Area

Hayden Creek and surrounding lower hillsides provide big-game winter range. This winter range does not support significant numbers of elk. (Hayden 1998). The area has heavy recreation use; several snowmobile trails are found within the winter range area.

The cumulative effects elk analysis area for the Hayden analysis area lies within Elk Habitat Units 9 and 10. The Forest Plan goal for elk habitat potential in Elk Habitat Unit 9 is 38%, existing elk habitat potential is

45%. The Forest Plan goal for elk habitat potential in Elk Habitat Unit 10 is 44%, existing elk habitat potential is 45%.

Alternative A

Direct and Indirect Effects: Although there would be a slight loss of thermal cover due to Douglas-fir beetle activity, analysis found that there were no measurable changes to cover:forage ratios, including effects of foreseeable sales. Foreseeable road closures and improvements in road closures would occur in the Hayden area, but would have immeasurable improvements in Elk Habitat Unit 10. In Elk Habitat Unit 9 (incorporating the southern portion of the Hayden area), there would be a minor reduction in open road densities and immeasurable improvements in improved road closures.

Cumulative Effects: Due to road closures in the past, there has been a recent minor improvement in the elk habitat of Elk Habitat Units 9 and 10. There would be minor improvements in open road densities and closure types, but an increase in the elk habitat potential would not likely occur, based on professional judgement considering the combined influence of each of these factors. Overall, the Forest Plan goal would continue to be met.

Alternatives B and D

Direct and Indirect Effects: Preliminary analysis or cover:forage ratios found immeasurable changes in the amount of thermal cover that would be lost beyond the effects of the beetle. There would be a minor increase in forage, and a minor reduction in canopy closure. Based on the analysis for Elk Habitat Unit 9, during sale activity there would be a moderate reduction in the elk habitat potential (from 45 to 42%) that may cause short-term displacement (less than 5 years) of some animals. Once road closures occur within the majority of Elk Habitat Unit 9 and activity is occurring in a portion of the Wolf Lodge drainage that will be helicopter logged, there would be minor improvements to the elk habitat potential (increasing to 44%). Post sale, a foreseeable sale in Elk Habitat Unit 9 that will not have gates on opened roads and will build additional roads will cause the elk habitat potential to fall back to 42%, causing moderate additional effects when compared to the No-Action Alternative. These effects are due to other foreseeable sale activities, not activities proposed under the Douglas-fir beetle project. Post sale, there would be a minor decrease in open road densities, with a moderate improvement in improved closures. In addition, a spur road in an existing elk security area above Jim Creek would be obliterated, creating a higher quality of security in this area. In both Elk Habitat Units 9 and 10, system roads built in association with project activities would be closed with an earth berm or guardrail gate, but would remain on the landscape over the long term. However, in the proposed system road locations, security is not currently optimal because of off-road motorcycle use and the adjacent open road. Therefore, the incremental effects of these system roads would be minor. During all stages of implementation, the elk habitat potential would remain above the Forest Plan goal.

Within Elk Habitat Unit 10, during sale activity the elk habitat potential would fall slightly below the Forest Plan goal. Activities would have minor effects on elk security. Subdivisions during winter logging along the Hayden Creek area would provide a secure place for big game, where logging activity would not occur (please refer to the description of alternative design features and mitigation measures in Chapter II). Compared to Alternative A, there would be over twice the miles of roads receiving improved closures under these alternatives. Reductions in open road densities would be so slight as to be inconsequential to elk. It is expected that following post-sale activity, the elk habitat potential in Elk Habitat Unit 10 would return to at least existing condition levels and may increase by 1% beyond the existing condition.

Cumulative Effects: There would be minor to moderate short-term effects to security during sale activity, with minor improvements in security beyond what would occur under Alternative A, due to improved road closures after sale activities are completed. In the short term, the Forest Plan goal may not be met in Elk Habitat Unit 10. Overall, cumulative effects would be minor to moderate over the short term, but would maintain the Forest Plan goal in the Elk habitat Unit over the long term.

Alternative C

Direct and Indirect Effects: Vegetative effects would be similar to those that would occur under Alternatives B and D. There would be less security loss than would occur under the other action alternatives, due to a lack of activity in the northern portion of the Hayden Analysis Area, and less activity in the Hell's Canyon area.

Cumulative Effects: The effects of the proposed project would be minor. There would be minor improvements in security beyond what would occur under Alternative A. Cumulatively, effects would be minor for the short term, with improved conditions for elk over the long term. The Forest Plan goal would continue to be met.

Alternative E

Direct and Indirect Effects: There would be no regeneration harvest under Alternative E, therefore there would be no additional forage created. Live canopy would be maintained in all stands; loss of thermal cover would not be expected to differ from the effects of the beetle-related tree mortality under Alternative A. Security effects would be similar to those under Alternatives B and D.

Cumulative Effects: Because the canopy closure changes between Alternatives B, D and E are not measurable, and forage is not limited in the Hayden area, cumulative effects would be similar to what would occur under Alternatives B and D, discussed above.

Alternative F

Direct and Indirect Effects: Security effects during sale activity would be similar to those that would occur under Alternative C. Due to additional prescribed burning, there may be a minor increase in forage which would benefit elk. Burning of units would not reduce cover enough to have a measurable negative impact on big game. A fuel break on ridges could increase recreational use; over the long term it would have minor effects on big-game security. There would be a minor decrease in security due to harvest activity. Improved road closures would provide for a minor increase in security. This alternative would provide for the least amount of security over the long term.

Cumulative Effects: Under this alternative, there would be a minor improvement in security in some areas, with some areas having a decrease in security over the long term. Cumulatively, there would be no long-term change in elk habitat potential.

Alternative G

Direct and Indirect Effects: There would be no decrease in the quality of security. Road removal and improved closures would have minor beneficial effects to elk. Wildlife forage stands would be burned, moderately improving forage.

Cumulative Effects: Past road closures have resulted in minor improvements in elk security. Improvements in wildlife forage would occur. There would be no negative effects to elk under this alternative, with minor security improvements. Cumulatively, there would be a minor improvement in elk habitat.

Coeur d'Alene Lake North Analysis Area

The cumulative effects elk analysis area for the Coeur d' Alene Lake North analysis area lies within Elk Habitat Units 7 and 9. This discussion addresses Elk Habitat Unit 7, which is where most of the analysis area is located. Elk Habitat Unit 9 is discussed within the Hayden Analysis Area, above. This is an important hunting area. A large portion of the analysis area is within winter range. A large portion of Compartment

368 provides approximately 3,000 acres of security. Analysis of cover:forage ratios and juxtaposition was completed, including foreseeable sales. The Forest Plan goal for elk habitat potential in Elk Habitat Unit 7 is 42%; current elk habitat potential is 44%. Five out of nine compartments in Elk Habitat Unit 7 have 10% or less total security acres.

Alternative A

Direct and Indirect Effects: Although there would be a slight loss of thermal cover due to Douglas-fir beetle-related tree mortality, analysis found that there was little to no change in cover:forage ratios, including effects of foreseeable sales. There would be minor improvements in elk security due to reduced open road densities and improved closures.

Cumulative Effects: There would be slight effects to vegetation under Alternative A. There would be minor improvements to security due to reduced open road densities and improved closures. Cumulatively, effects would be minor and the Forest Plan goal for elk habitat potential would continue to be met.

Alternatives B, D and E

Direct and Indirect Effects: It is predicted that the vegetative effects of the action alternatives would not differ from the effects that would occur under Alternative A, since none of them propose regeneration harvest in this analysis area. There would be slight effects to elk under these alternatives due to changes in vegetation from the beetle activity. Based on the analysis for Elk Habitat Unit 7, during sale activity there would be a minor reduction in the elk habitat potential (to 43%) that may cause short-term displacement (less than 5 years) of some animals. Once improved road closures occur within the majority of Elk Habitat Unit 7 and activity is occurring in a portion of the Wolf Lodge drainage that will be helicopter would be elk habitat potential would increase to 48%. Post sale, a foreseeable sale that will not have gates on opened roads and will build additional roads will cause the elk habitat potential to fall back to 47%, which would still exceed the Forest Plan goal. Subdivisions within the Wolf Lodge drainage (in the Coeur d' Alene North analysis area), would retain a secure area year round for big game to reside, undisturbed by harvest activity. There would be no winter logging in the winter range of Wolf Lodge drainage. Security habitat would be reduced by opening roads that are currently closed. This would be partially mitigated by the use of gates.

Cumulative Effects: The Douglas-fir beetle project activities would slightly decrease the elk habitat potential (by 1%), but would remain above the Forest Plan goal. Improved road closures would have a moderate long-term improvement. A foreseeable timber sale in the area would have minor effects to elk security. Cumulatively, there would be a moderate beneficial effect to elk habitat after sale activities are completed, and elk habitat potential would increase.

Prescribed burns to improve wildlife habitat (proposed as an opportunity under Alternative D) would be beneficial to big-game, because burning would stimulate browse.

Alternative C

Direct, Indirect, and Cumulative Effects: Effects to vegetation would be similar to what would occur under Alternatives B, D, and E. Because no temporary roads would be built, there would be slightly less security loss under Alternative C than under those alternatives. However, the majority of the same system roads would be used under Alternative C, causing the difference in effects between this and the other three alternatives to be small. The same number of roads would be improved as would occur under Alternative B. Cumulative effects would be similar to what would occur under Alternatives B, D, and E.

Alternative F

Direct and Indirect Effects: Slashing and burning within stands would create additional forage. However, some of the burning is proposed where the landscape is fairly open due to past harvest, and the burning could further reduce hiding cover. Security effects would be minor during project activity.

Cumulative Effects: This alternative may have minor reductions in hiding cover, and minor improvements in enhancement of forage. Over the short term, the proposed activities would have minor impacts to security. New road closures and improved road closures anticipated in association with ongoing timber sales and the proposed activities would moderately improve elk habitat potential. A foreseeable project will have minor effects to elk. Cumulatively, there would be a moderate benefit to elk due to road closures, and the elk habitat potential would moderately increase.

Alternative G

Direct and Indirect Effects: There would be no effects to canopy closure beyond those that would occur under Alternative A. Ecosystem burning would benefit big game by increasing forage production. There would be moderate to high improvements in security. This alternative would be the most beneficial to big game.

Cumulative Effects: This alternative would have moderate to high improvements in elk security, with no negative effects. A minor reduction in security would occur due to a foreseeable project. Cumulatively, there would be moderate benefits to elk habitat.

Coeur d' Alene Lake South Analysis Area

The cumulative effects elk analysis area for the Coeur d' Alene Lake South analysis area lies within Elk Habitat Unit 8. Three of the six compartments in Elk Habitat Unit 8 (Compartments 372, 373, and part of 315) are within Coeur d' Alene Lake South analysis area. The quality hunt area is located partially within this analysis area and partially within the Chain Lakes Analysis Area. Recent reductions in hiding cover due to timber harvest have reduced the amount and quality of hiding cover in a portion of the Pleasant and Carrill Creek drainages, within the quality hunt area. The existing elk habitat potential in Elk Habitat Unit 8 is 56%, well above the Forest Plan goal of 41%.

Effects Common to All Action Alternatives

After project activities are completed (post sale), there would be a moderate improvement in seasonal closures in the quality hunt area.

Alternative A

Direct and Indirect Effects: There would be a minor loss of thermal cover due to project activities. Security for elk would be improved slightly due to road closures.

Cumulative Effects: There would be some improvements in security and a minor decrease in thermal cover due to the beetle activity. Cumulatively, there would be minor improvement to elk security due to foreseeable road closures. The Forest Plan goal for elk habitat potential would continue to be met.

Alternatives B, C and D

Direct and Indirect Effects: Past activities, such as road closures, have resulted in a minor improvement to elk security. Vegetatively, there may be a minor loss of cover beyond the effects of the beetle due to regeneration harvest. Regeneration harvest in Unit 163, in the quality hunt area, would further reduce cover

for big game in a drainage where hiding cover is limited. Although analysis found that overall the quality hunt area is not limited, there would be minor to moderate effects on individual big game within the Pleasant Creek Drainage. Under Alternative D, thinning to improve western larch would have immeasurable effects on the loss of cover, beyond what would occur under Alternatives B and C. Over the short term, elk habitat potential could drop by 1 to 2%. Re-entry into a currently open area would delay road closures that would occur under Alternative A. Over the long term, elk habitat potential would increase above the existing condition by at least one to two percentage points. The closures would be approximately twice the amount that would occur under Alternative A, and would moderately increase the security for elk.

Cumulative Effects: Since the current elk habitat potential exceeds the Forest Plan goal and there are no negative effects to elk security from past activities, there would be no cumulative effects to elk under Alternatives B, C and D. There would be short-term minor impacts due to loss of security during sale activities, and longer-term minor effects to loss of hiding cover in one drainage. Over the long term, there would be a moderate increase in security due to reduced open road densities and improvements in the quality hunt area. Overall, there would be moderate improvements in security, with a minor loss of hiding cover.

Alternative E

Direct and Indirect Effects: Because Alternative E does not propose regeneration harvest, loss of cover would be less than would occur under Alternatives B, C and D. There would be no measurable loss of canopy closure beyond the beetle-related tree mortality. Security effects would be similar to those under Alternatives B, C, and D.

Cumulative Effects: There would be short-term minor impacts due to loss of security during sale activities. Over the long term, there would be a moderate increase in security due to reduced open road densities and improvements in the quality hunt area. Overall, there would be a moderate improvement in elk habitat. The Forest Plan goal for elk habitat potential would continue to be met, with increases above the existing potential.

Alternative F

Direct and Indirect Effects: Proposed slashing and prescribed burning in this area under Alternative F may improve forage, but would also reduce hiding cover in a drainage that is not limited in forage within the quality hunt area. There would be considerably less activity under this alternative, although foreseeable road closures would be postponed due to use of the roads for the Douglas-fir beetle project. It is unlikely that this alternative would decrease the elk habitat potential during sale activity. Post sale, there would be minor additional road closures (6.2 miles) beyond what would occur under Alternative A. There would be a minor benefit to elk security.

Cumulative Effects: There would be a minor decrease in hiding cover. Although there may be a minor loss of security, changes are small enough that it is unlikely the elk habitat potential would drop. Cumulatively, there would be minor improvements in elk security and minor reductions in hiding cover. The Forest Plan goal would continue to be met.

Alternative G

Direct and Indirect Effects: There would be burning of forage units that would benefit big game. Improved road closures would result in a minor to moderate improvement in big-game security. There would be no negative effects to elk, with a predicted moderate increase (1 to 2%) in the elk habitat potential. Cumulatively, there would be a minor improvement in elk habitat.

Cumulative Effects: This alternative would moderately improve security for big game and forage. Cumulatively, there would be minor improvements in elk security, and the elk habitat potential would increase above the existing condition.

Chain Lakes Analysis Area

Chain Lakes Analysis Area falls within Elk Habitat Unit 8. Elk Habitat Unit 8 contains compartments 315, 372 and the 3 compartments found in Chain Lakes Analysis Area: 316, 347 and 374. Winter range is found primarily on the southern end of the Analysis Area at the lower elevations. Currently, the elk habitat potential is well above the Forest Plan goal. The Forest Plan goal for elk habitat potential in Elk Habitat Unit 8 is 41%; existing elk habitat potential is 56%. Elk Habitat Unit 8 also includes the Coeur d' Alene Lake South area, which is discussed above. In both analysis areas, should winter logging occur, areas free of disturbance below 3,000 feet in elevation would be provided.

Effects Common to Alternatives B, D, E, C, and G

Post sale, there would be reductions in open road densities, which would improve security for elk. Compared to Alternative A, there would be from 14 to 24 miles of additional roads closed. These road closures would be accomplished with guardrail gates that would be closed during hunting season, improving elk security.

Alternative A

Direct and Indirect Effects: Mortality as a result of the Douglas-fir beetle would reduce canopies. In some cases thermal cover in winter ranges may be reduced. Forage production is anticipated to increase as these stands fall apart. No new roads would be constructed. Approximately 19 miles of foreseeable road closures would occur.

Cumulative Effects: Minor reductions in thermal cover would occur. There would be moderate improvements in road closures, resulting in moderate improvements to elk security. Cumulative effects are minor. The Forest Plan goal for elk habitat potential would continue to be met.

Alternatives B, C and D

Direct and Indirect Effects: Vegetatively effects are similar. Regeneration harvests would result in a loss of hiding cover in a concentrated area in the northeast portion of the analysis area. Due to the canopy closure loss by the Douglas fir beetle activity, there would be no measurable effects to thermal cover beyond the effects of alternative A. Within compartment 316 security is reduced by approximately half during harvest operations. Under Alternatives B and D, there would be a minor short-term decrease in hiding cover in the analysis area as a whole, and a minor decrease in thermal cover due to effects of Douglas-fir beetle. There would be minor short-term effects to big game due to loss of security. Minor reductions in open road densities beyond the improvements that would occur under Alternative A would improve security for elk over the long term. Post sale and with foreseeable road closures, there would be 33 miles of road closed during hunting season.

Cumulative Effects: There would be a minor loss of security due to activities that would occur in currently secure areas, having moderate short-term effects, although there are alternate secure areas for big game to move to. Overall (post sale), there would be moderate improvements in elk security that would increase the elk habitat potential. The Forest Plan goal would continue to be met.

Alternative E

Direct and Indirect Effects: Effects to security would be the same as under Alternatives B and D. Vegetatively, there would be no additional effects to thermal cover beyond what would occur under Alternative A. All harvested areas would continue to provide cover.

Cumulative Effects: Loss of security during sale activity would be minor, with moderate improvements as a result of road closures. Cumulatively, there would be moderate improvements to elk security. The Forest Plan goal for elk habitat potential would continue to be met (elk habitat potential would increase).

Alternative F

Direct and Indirect Effects: Under alternative F, there would be a moderate improvement in elk forage due to prescribed burning. A minor loss of hiding cover beyond the effects of the selective harvests may occur. There will be minor effects due to disturbance, resulting in a loss of security. Because there will be less areas of short term disturbance, it is not expected that the elk habitat potential would decrease beyond a 1% decline at the most. Under this alternative, there would be slight increases in security above what would occur under Alternative A.

Cumulative Effects: This action would improve forage, and slightly reduce thermal cover. Loss of security due to project activity is minor as well as the change in reduced road densities beyond alternative A for the long term. Cumulatively, there would be a minor improvement in elk habitat, mostly due to foreseeable road closures. The Forest Plan goal for elk habitat potential would continue to be met.

Alternative G

Direct and Indirect Effects: Under this alternative, thermal cover would not differ from what would occur under Alternative A. Prescribed burning would improve forage habitat. There would be no harvest activity. There would be reduced open road densities that would be similar to what would occur under Alternatives B, C and D.

Cumulative Effects: There would not be a loss of security over the short term, with only moderate improvements in security. Cumulatively, there would be a moderate improvement in elk security.

Steamboat Analysis Area

The Steamboat Area lies within Wallace Elk Habitat Unit 6. This Elk Habitat Unit covers approximately 41,248 acres. The Forest Plan goal for elk habitat potential in Elk Habitat Unit 6 is 28%. The current elk habitat potential is well above that, at 41%. Cover is limiting in compartment 142. Both elk summer range and big game winter range lie within the Analysis Area.

Alternative A

Direct and Indirect Effects: The loss of canopies due to Douglas-fir bark beetle-related tree mortality would have little impact upon elk habitat. Holes in the canopy would increase browse production. Since these openings would be small, hiding cover and thermal cover would be in close proximity to available forage. No reductions in security would occur.

Cumulative Effects: Loss of security from past activities until recently was moderate to high. Recent road obliterations have caused improvements in security, so that currently the elk habitat potential exceeds the Forest Plan goal. This alternative would result in a slight reduction in canopy closure and no effects to security. Cumulative effects would remain the same as the existing condition.

Alternatives B, C, and D

Direct and Indirect Effects: Under Alternatives B, C, and D, a 1,039-acre security area in Compartment 181 would be reduced during sale activities. Another 2,527 acres of security would be reduced in Compartment 144 during activities. Gates would be closed at road entrances during all sale activities except hauling. This would reduce disturbance to some extent during sale. These activities would cause the elk habitat potential to decrease slightly (by about 1%). Post-sale gates would ensure that security is provided in these areas. Post sale, there would be no change to security from what would occur under Alternative A.

Cumulative Effects: Loss of short-term security would be minor. Post sale, security effects would be the same as under Alternative A. Long term, the elk habitat potential would not differ from the existing condition.

Alternative E

Direct and Indirect Effects: Selection harvest would maintain canopy cover, and would have less of an effect to hiding cover than alternatives B and D. Security effects would be the same as the previous alternatives.

Cumulative Effects: Loss of canopy closure would not exceed that which would occur under Alternative A. Security effects would be short term and minor. Cumulatively, the elk habitat potential would remain the same as is existing.

Alternative F

Direct, Indirect and Cumulative Effects: Alternative F would have the same effects as the No-Action Alternative.

Alternative G

Direct and Indirect Effects: Restoration work would slightly reduce open road densities. There would be no loss of security during project activities and minor improvements in reducing open road densities.

Cumulative Effects: This alternative would have no negative effects beyond what would occur under Alternative A, and would have minor improvements in security. Cumulatively, there would be minor improvements in elk security.

Bumblebee Analysis Area

The elk analysis area for the Bumblebee Area lies within two Fernan Elk Habitat Units and includes 3 timber compartments. The analysis area lies within Fernan Elk Habitat Units 5 and 6. Elk Habitat Unit 5 contains compartments 346, 357 and 378 (Compartments 357 and 378 are within the Bumblebee analysis area). Elk Habitat Unit 6 has compartments 348, 377, 380, and 379 (Bumblebee analysis area). The Forest Plan goal for elk habitat potential in Elk Habitat Unit 5 is 38%, existing potential is 59%. The goals for elk habitat potential in Elk Habitat Unit 6 is 51%, existing potential is 45%. The proposed activities are concentrated in Elk Habitat Unit 5.

Important big-game winter range is found along Bumblebee Creek, Little Bumblebee Creek, Little Tepee Creek, and Canyon Creek. Shell Ridge is important summer range. Thermal cover is provided on north slopes along Shell Ridge. Recent road obliterations have improved elk security in this area.

Alternative A

Direct and Indirect Effects: Under the No-Action Alternative, there would be no change in security or road densities. Some canopies would decrease as a result of the Douglas-fir beetle. These stands would still provide hiding cover. In some cases thermal cover would be reduced. No change in elk habitat potentials would result.

Cumulative Effects: Elk habitat potential currently exceeds the Forest Plan goal in Elk Habitat Unit 5, but there has been a high level of effects in Elk Habitat Unit 6, due to past activities. There are minor effects to elk in Elk Habitat Unit 5. There would be no changes to elk security. Vegetative effects to thermal cover would be minor. Cumulatively, effects would be remain the same as the existing condition.

Alternatives B, C, and D

Direct and Indirect Effects: Effects apply only to Elk Habitat Unit 5; there are no activities proposed in Elk Habitat Unit 6. Under these alternatives, Road 1521 would be reopened, slightly reducing security within the Bumblebee Analysis Area. It is not expected that the elk habitat potential would fall more than 1% below the existing condition. Regeneration harvest would result in a minor loss of hiding cover and thermal cover. Selectively harvested units would continue to provide hiding cover. Harvest within this winter range should stimulate browse production.

Cumulative Effects: Due to past road closures, the current elk habitat potential exceeds the Forest Plan goal. There has been a high level of effect to elk habitat potential in Elk Habitat Unit 6. There would be a slight loss of security and thermal cover over the short term in Elk Habitat Unit 5. Over the long term, the elk habitat potential in Elk Habitat Unit 5 would remain the same as is existing. Based on past activities in Elk Habitat Unit 6, cumulative effects to elk habitat potential would be high.

Alternative E

Direct and Indirect Effects: Vegetative effects would not differ from what would occur under Alternative A. Security effects would be similar to other action alternatives.

Cumulative Effects: Cumulative effects would be similar to what would occur under Alternatives B, C and D, except that there would be no effects to hiding cover under Alternative E beyond the minor effects that would occur under Alternative A.

Alternative F

Direct, Indirect and Cumulative Effects: Alternative F would have the same effects as the No-Action Alternative.

Alternative G

Direct and Indirect Effects: There would be no scheduled burning in this analysis area. Reduced open road densities by closing the 796 road would have a moderate improvement in security acres.

Cumulative Effects: There has been a high level of negative effects to elk habitat potential in Elk Habitat Unit 6, due to past activities. There would be minor improvements to elk security in Elk Habitat Unit 5. There would be no vegetative effects beyond Alternative A. Cumulative, there would be minor improvements that would benefit elk in Elk habitat Unit 5. Effects would remain high in Elk Habitat Unit 6.

Hart Analysis Area

Both elk summer range and winter range are found within the Hart Analysis Area. Cover is not limited in the analysis area. The elk analysis area for the Hart Area lies within three Wallace Elk Habitat Units and includes 5 timber compartments. The three Elk Habitat Units partially within the area include 3, 5, and 7.

Alternative A

Direct and Indirect Effects: Due to foreseeable road closures, there will be minor improvements in reduced overall road densities. The low anticipated amount of beetle activity within the Analysis Area would result in a minor loss of thermal cover. Stands would continue to provide hiding cover.

Cumulative Effects: Due to past activities, cumulative effects are high in two areas where activities are occurring, in Elk Habitat Unit 3 and 5. The current elk habitat potential exceeds the Forest Plan goal in Elk Habitat Unit 7 due to foreseeable road closures. Under Alternative A, there would be a minor increase in security and a minor decrease in thermal cover. Cumulatively, effects would be high in the compartments within Elk Habitat Units 3 and 5. The elk habitat potential in Elk Habitat Unit 7 would not change from the existing condition.

Alternatives B and D

Direct and Indirect Effects: Alternatives B and D would have similar changes in thermal and hiding cover. Regeneration harvests would slightly decrease hiding cover, while selective harvests would continue to provide hiding cover. Due to the effects of the beetle activity, there would be a minor loss of thermal cover. Security effects in Compartment 189 (Elk Habitat Unit 5) would have the most disturbance during sale activity and the most post-sale security reduction. Minor reductions in open road densities would occur post sale due to foreseeable activities that are postponed as a result of proposed project activity. The road miles proposed for closure (4.0 miles) would not be enough to change the elk habitat potential. Under Alternative D, newly-constructed system roads would be closed, but the road prism would have a minor long term effect on elk security.

Cumulative Effects: Past activities in the majority of the project area have had moderate to high effects. Under Alternative D, minor reductions in hiding cover would occur due to regeneration harvests. There will be a minor reduction in open road densities due to foreseeable projects. Over the long term, system roads under Alternative D would slightly decrease the quality of security. Cumulatively, effects would remain high in Elk Habitat Units 3 and 5; there would be no change from the existing elk habitat potential in Elk Habitat Unit 7.

Cumulative effects under Alternative B would be similar to those under Alternative D for vegetation and past activities. There would be no long-term effect on security since system roads would not be implemented. Foreseeable road closures will trend the area to a minor reduction in open road densities. Cumulative effects post sale due to past activity would remain high in Elk Habitat Units 3 and 5, and would remain the same as existing in Elk Habitat Unit 7.

Alternative C

Direct and Indirect Effects: Vegetative effects would be similar to what would occur under Alternatives B and D. Loss of security acres would be less under Alternative C because there would be no system or temporary roads built. This alternative would have the least impact short term and would still maintain decreased open road densities due to foreseeable projects long term.

Cumulative Effects: Cumulative effects would be similar to what would occur under Alternative B.

Alternative E

Direct and Indirect Effects: Under Alternative E, thermal and hiding cover would not differ from what would occur under Alternative A. Security effects would be similar to what would occur under Alternative B.
Cumulative Effects: Past activities have resulted in high effects to elk. There would be no minor loss of hiding cover, and no loss of thermal cover beyond what would occur under Alternative A. Cumulative effects would be the same as under Alternative B.

Alternative F

Direct and Indirect Effects: Burning activities under Alternative F would have positive effects to elk forage. There would be a minor loss of hiding cover. Security effects would be similar to what would occur under Alternatives B and C.

Cumulative Effects: There have been substantial reductions in the elk habitat potential as a result of past activities. Effects to security would be similar to what would occur under Alternatives B and C. Proposed burning activities would have a minor benefit to elk.

Alternative G

Direct and Indirect Effects: There would be no change in thermal cover beyond what would occur under Alternative A. There would be no effects to security over the short term. There would be a slight improvement in open road densities over the existing condition.

Cumulative Effects: Cumulative effects would remain high in Elk Habitat Units 3 and 5. Elk habitat potential would remain above the Forest Plan goal in Elk Habitat Unit 7.

Summary of Cumulative Effects for the Coeur d'Alene River Ranger District Project

The following tables provide a summary of the anticipated effects to Sensitive, Management Indicator, and Other Species. The "MI" conclusion ("May impact individuals or habitat but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.") indicates activities or actions that would result in effects that would be immeasurable, minor, or are consistent with the appropriate conservation strategies (USDA Forest Service, 1995). It should be noted that the projected effects of beetle activity (Alternative A) are carried forward through the rest of the alternatives, even if there are no distinguishable effects associated with a particular alternative. A more detailed discussion of effects can be found with narratives of each species earlier in this chapter.

Table III-100. Sensitive species conclusion of effects summary, Coeur d'Alene River Ranger District, Wildlife Analysis Area Scale.

Species	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
BLACK-BACKED WOODPECKER							
Hayden	BI	MI	MI	MI	MI	MI	MI
Coeur d'Alene Lake North	BI	MI	MI	MI	MI	MI	MI
Coeur d'Alene Lake South	BI	MI	MI	MI	MI	MI	MI
Chain Lakes	BI	MI	MI	MI	MI	MI	MI
Steamboat	BI	MI	MI	MI	MI	MI	MI
Bumblebee	BI	MI	MI	MI	MI	MI	MI
Hart	BI	MI	MI	MI	MI	MI	MI
BOREAL TOAD							
Hayden	NI	NI	NI	NI	NI	NI	NI
Coeur d'Alene Lake North	NI	NI	NI	NI	NI	NI	NI
Coeur d'Alene Lake South	NI	NI	NI	NI	NI	NI	NI
Chain Lakes	NI	NI	NI	NI	NI	NI	NI
Steamboat	NI	NI	NI	NI	NI	NI	NI
Bumblebee	NI	NI	NI	NI	NI	NI	NI
Hart	NI	NI	NI	NI	NI	NI	NI
COEUR D'ALENE SALAMANDER							
Hayden	NI	NI	NI	NI	NI	NI	NI
Coeur d'Alene Lake North	NI	NI	NI	NI	NI	NI	NI
Coeur d'Alene Lake South	NI	MI	MI	MI	MI	NI	MI
Chain Lakes	NI	NI	NI	NI	NI	NI	NI
Steamboat	NI	NI	NI	NI	NI	NI	NI
Bumblebee	NI	NI	NI	NI	NI	NI	NI
Hart	NI	NI	NI	NI	NI	NI	NI
COMMON LOON							
Hayden	NI	NI	NI	NI	NI	NI	NI
Coeur d'Alene Lake North	NI	NI	NI	NI	NI	NI	NI
Coeur d'Alene Lake South	NI	NI	NI	NI	NI	NI	NI
Chain Lakes	NI	NI	NI	NI	NI	NI	NI
Steamboat	NI	NI	NI	NI	NI	NI	NI
Bumblebee	NI	NI	NI	NI	NI	NI	NI
Hart	NI	NI	NI	NI	NI	NI	NI
FISHER							
Hayden	MI	MI	MI	MI	MI	MI	MI
Coeur d'Alene Lake North	MI	MI	MI	MI	MI	MI	MI
Coeur d'Alene Lake South	MI	MI	MI	MI	MI	MI	MI
Chain Lakes	MI	MI	MI	MI	MI	MI	MI
Steamboat	MI	MI	MI	MI	MI	MI	MI
Bumblebee	MI	MI	MI	MI	MI	MI	MI
Hart	MI	MI	MI	MI	MI	MI	MI
FLAMMULATED OWL							
Hayden	MI	MI	MI	MI	MI	MI	MI
Coeur d'Alene Lake North	MI	MI	MI	MI	MI	MI	MI
Coeur d'Alene Lake South	MI	MI	MI	MI	MI	MI	MI
Chain Lakes	MI	MI	MI	MI	MI	MI	MI
Steamboat	NI	NI	NI	NI	NI	NI	NI
Bumblebee	MI	MI	MI	MI	MI	MI	MI
Hart	MI	MI	MI	MI	MI	MI	MI
HARLEQUIN DUCK							
Hayden	NI	NI	NI	NI	NI	NI	NI
Coeur d'Alene Lake North	NI	NI	NI	NI	NI	NI	NI
Coeur d'Alene Lake South	NI	NI	NI	NI	NI	NI	NI
Chain Lakes	NI	NI	NI	NI	NI	NI	NI
Steamboat	NI	NI	NI	NI	NI	NI	NI
Bumblebee	NI	NI	NI	NI	NI	NI	NI
Hart	NI	NI	NI	NI	NI	NI	NI
NORTHERN BOG LEMMING							
Hayden	NI	NI	NI	NI	NI	NI	NI

Species	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Coeur d'Alene Lake North	NI	NI	NI	NI	NI	NI	NI
Coeur d'Alene Lake South	NI	NI	NI	NI	NI	NI	NI
Chain Lakes	NI	NI	NI	NI	NI	NI	NI
Steamboat	NI	NI	NI	NI	NI	NI	NI
Bumblebee	NI	NI	NI	NI	NI	NI	NI
Hart	NI	NI	NI	NI	NI	NI	NI
NORTHERN GOSHAWK							
Hayden	MI	MI	MI	MI	MI	MI	MI
Coeur d'Alene Lake North	MI	MI	MI	MI	MI	MI	MI
Coeur d'Alene Lake South	MI	MI	MI	MI	MI	MI	MI
Chain Lakes	MI	MI	MI	MI	MI	MI	MI
Steamboat	NI	NI	NI	NI	NI	NI	NI
Bumblebee	NI	NI	NI	NI	NI	NI	NI
Hart	NI	NI	NI	NI	NI	NI	NI
NORTHERN LEOPARD FROG							
Hayden	NI	NI	NI	NI	NI	NI	NI
Coeur d'Alene Lake North	NI	NI	NI	NI	NI	NI	NI
Coeur d'Alene Lake South	NI	NI	NI	NI	NI	NI	NI
Chain Lakes	NI	NI	NI	NI	NI	NI	NI
Steamboat	NI	NI	NI	NI	NI	NI	NI
Bumblebee	NI	NI	NI	NI	NI	NI	NI
Hart	NI	NI	NI	NI	NI	NI	NI
TOWNSEND'S BIG-EARED BAT							
Hayden	NI	NI	NI	NI	NI	NI	NI
Coeur d'Alene Lake North	NI	MI	MI	MI	MI	MI	MI
Coeur d'Alene Lake South	NI	MI	MI	MI	MI	MI	MI
Chain Lakes	NI	MI	MI	MI	MI	MI	MI
Steamboat	NI	NI	NI	NI	NI	NI	NI
Bumblebee	NI	NI	NI	NI	NI	NI	NI
Hart	NI	NI	NI	NI	NI	NI	NI
WHITE-HEADED WOODPECKER							
Hayden	MI	MI	MI	MI	MI	MI	MI
Coeur d'Alene Lake North	MI	MI	MI	MI	MI	MI	MI
Coeur d'Alene Lake South	MI	MI	MI	MI	MI	MI	MI
Chain Lakes	MI	MI	MI	MI	MI	MI	MI
Steamboat	NI	NI	NI	NI	NI	NI	NI
Bumblebee	MI	MI	MI	MI	MI	MI	MI
Hart	MI	MI	MI	MI	MI	MI	MI
WOLVERINE							
Hayden	NI	NI	NI	NI	NI	NI	NI
Coeur d'Alene Lake North	NI	NI	NI	NI	NI	NI	NI
Coeur d'Alene Lake South	NI	NI	NI	NI	NI	NI	NI
Chain Lakes	NI	NI	NI	NI	NI	NI	NI
Steamboat	NI	NI	NI	NI	NI	NI	NI
Bumblebee	NI	NI	NI	NI	NI	NI	NI
Hart	NI	NI	NI	NI	NI	NI	NI

NI = No Impact
MI = May impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.
WI = would impact individuals or habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species.
BI = Beneficial Impact

Table III-101. Management Indicator Species conclusion of effects summary, Coeur d'Alene River Ranger District, Wildlife Analysis Area Scale.

Species	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Elk							
Hayden	NI	NI	NI	NI	NI	NI	NI
Coeur d' Alene N	BI	BI	BI	BI	BI	BI	BI
Coeur d' Alene South	BI	BI	BI	BI	BI	BI	BI
Chain lakes	BI	BI	BI	BI	BI	BI	BI
Bumblebee	NI	NI	NI	NI	NI	NI	BI
Steamboat	NI	NI	NI	NI	NI	NI	BI
Hart	MI	MI	MI	MI	MI	MI	MI
Marten							
Hayden	MI	MI	MI	MI	MI	MI	MI
Coeur d' Alene N	MI	MI	MI	MI	MI	MI	MI
Coeur d' Alene South	MI	MI	MI	MI	MI	MI	MI
Chain lakes	MI	MI	MI	MI	MI	MI	MI
Bumblebee	MI	MI	MI	MI	MI	MI	MI
Steamboat	MI	MI	MI	MI	MI	MI	MI
Hart	MI	MI	MI	MI	MI	MI	MI
Pileated woodpecker							
Hayden	BI	MI	MI	MI	MI	MI	MI
Coeur d' Alene N	BI	MI	MI	MI	MI	MI	MI
Coeur d' Alene South	BI	MI	MI	MI	MI	MI	MI
Chain lakes	BI	MI	MI	MI	MI	MI	MI
Bumblebee	BI	MI	MI	MI	MI	MI	MI
Steamboat	BI	MI	MI	MI	MI	MI	MI
Hart	BI	MI	MI	MI	MI	MI	MI

NI = No Impact
MI = May impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.
WI = Will impact individuals or habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species.
BI = Beneficial Impact

Table III-102. Sensitive species conclusion of effects summary, Coeur d'Alene River Ranger District Project Area Scale.

Species	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Black-backed woodpecker	BI	MI	MI	MI	MI	MI	MI
Boreal toad	NI	NI	NI	NI	NI	NI	NI
Coeur d'Alene salamander	NI	MI	MI	MI	MI	NI	MI
Common loon	NI	NI	NI	NI	NI	NI	NI
Fisher	MI	MI	MI	MI	MI	MI	MI
Flammulated owl	MI	MI	MI	MI	MI	MI	MI
Harlequin duck	NI	NI	NI	NI	NI	NI	NI
Northern bog lemming	NI	NI	NI	NI	NI	NI	NI
Northern goshawk	MI	MI	MI	MI	MI	MI	MI
Northern leopard frog	NI	NI	NI	NI	NI	NI	NI
Townsend's big-eared bat	NI	NI	NI	NI	NI	NI	NI
White-headed woodpecker	MI	MI	MI	MI	MI	MI	MI
Wolverine	NI	NI	NI	NI	NI	NI	NI

Table III-103. Management Indicator Species conclusion of effects summary, Coeur d'Alene River Ranger District Project Area Scale.

Species	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
American marten	MI	MI	MI	MI	MI	MI	MI
Elk	NI	NI	NI	NI	NI	NI	NI
Pileated woodpecker	BI	MI	MI	MI	MI	MI	MI

NI = No Impact
MI = May impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability to the population or species.
WI = Will impact individuals or habitat with a consequence that the action may contribute to a trend towards Federal listing or cause a loss of viability to the population or species.
BI = Beneficial Impact

Effects of Opportunities

Direct, indirect and cumulative effects to wildlife species (except the Coeur d'Alene salamander) as a result of activities identified as opportunities would be beneficial in all analysis areas. Minor, short-term beneficial effects to Coeur d'Alene salamander could be anticipated in all analysis areas as a result of riparian habitat protection (through use of the Inland Native Fish Strategy buffers) and riparian road obliteration.

Consistency With the Forest Plan and Other Applicable Regulatory Direction

All alternatives would be consistent with Forest Plan management direction, goals, objectives, standards and guidelines for the management and protection of wildlife habitat and species.

RECREATION/ACCESS

REGULATORY FRAMEWORK

Recreation goals and objectives as identified in the Forest Plan (sections II-3 (A) and (B)) are to provide for the projected use of developed recreation areas with development of new sites as budget becomes available, to provide for a variety of dispersed recreation opportunities, to pursue opportunities to increase and improve the recreation trail system, and to continue and increase cooperative trail programs with organizations, clubs and other public agencies.

- *Recreation Standard 1: Continue to provide a share of recreation opportunities.*
- *Recreation Standard 7: Provide a broad spectrum of dispersed and developed recreation opportunities.*
- *Recreation Standard 8: Treat and maintain timber stands in a manner compatible with recreation objectives.*
- *Recreation Standard 10: Trails will be managed in accordance with management area requirements.*

Determination of the existing conditions for recreation activities, facilities and opportunities is derived from facility inventories, facility maintenance work, observation by recreation specialists and technical personnel and contact with recreation user groups and individuals. Guidance for management of recreation resources is provided in various National Forest manuals and handbooks as well as professional publications and documents.

The goal of recreation management in a wildland location is to provide a variety of settings that allow a diversity of outdoor recreation opportunities for visitors. Recreation opportunities includes a combination of activities, settings and facilities which to some extent predict the probable experiences a visitor to a given area might have. This arrangement of social benefits is called the Recreation Opportunity Spectrum (Forest Service Handbook 86). The Recreation Opportunity Spectrum concept provides a framework which allows administrators to manage for and users enjoy a variety of outdoor environments. The Recreation Opportunity Spectrum is not a land classification system: it is a method of describing and providing a mix of recreation opportunities. The ROS has been divided into six major classes for Forest Service use: urban, rural, roaded natural, semi-primitive motorized, semi-primitive non-motorized and primitive.

Another way to characterize and evaluate recreation conditions is defined in the "Coeur d' Alene Geographic Assessment". This concept refers to how people define ecosystems and specific locations in the landscape based on their meanings and images; defined as "sense of place". Examples of places found in the Coeur d' Alene basin are lakes and streams, (water corridors), back-country, high mountain, wildland areas close to urbanized zones or interface and general forest landscapes.

Finally, access to wildlands for the purposes of recreation experience can be quantified and classified by method of access.

AFFECTED ENVIRONMENT

Characterization

North Idaho and eastern Washington are becoming recreation destinations, rather than stops along the way. People living in Spokane County, the most populated county in the Columbia River Basin, use all areas of the IPNFs as major destinations for outdoor recreation.

The Coeur d'Alene area is located within major transportation corridors (Interstate 90 and U.S. Highway 95). Many of the preferred playground areas in the Coeur d'Alene River Ranger District are within 20 to 70 miles of the urban population. There is a high density of roads within much of the basin, except within those areas

identified as roadless. Lakes, rivers, and streams are popular for boating, floating, fishing, swimming, picnicking, and camping. These corridors are where most of the developed campgrounds are located. These corridors are also where most of the largest and most used dispersed camping sites are located. Recreational activities are heavy within these corridors. The Independence Creek and Upper Coeur d'Alene River are two backcountry areas located in the northern part of the Coeur d'Alene River Basin and valued for their undeveloped characteristics. They are mostly roadless, with dispersed trail-based recreation.

Current recreation activities within the project area include fishing, camping, berry picking, visiting historic sites, firewood gathering and upland bird and big game hunting. The area is visited by local residents , recreationists from nearby urban areas, and vacationers and retirees travelling through the area. Winter activities include snowmobiling and cross country skiing. The road systems are used to enjoy the scenery, visit historic sites, and participate in the above activities. The dispersed campsites have developed primarily for camping, big game hunting and fishing activities.

The existing recreation opportunities and settings in the Coeur d'Alene project area are classified as roaded natural appearing and roaded modified.

Existing Conditions

Hayden Area

This area provides a scenic backdrop for Hayden Lake. Little public land lies adjacent to the lake. Mokins Bay Campground occupies a small parcel of National Forest land on the east shore of the lake. It is a 15-unit campground that realizes approximately 4,000 visitor days per season (May to September). Most use at the site occurs from mid-June to Labor Day. Occupancy averages 60% during this period.

Other National Forest recreation resources in the area lie away from the lake shore. The English Point recreation trail system lies just to the north of Hayden Lake. It features 7 miles of trail open for non-motorized uses. The Chilco Mountain National Recreation Trail (#14) is 6.3 miles in length and occupies only the northeast corner of the Hayden analysis area. The trail is open to multiple uses. The Hells Canyon Trail (#234) is 3.5 miles long and is located at about mid-point in the East Fork of Hayden Creek. The Bud Howard Trail (#29) swings along the north face of West Canfield Butte and emerges onto private land near Totten's pond. There is no public easement at the west end of this trail although there have been attempts to acquire one. Continued access to this trail is not assured as land development progresses.

Principal road access into the area is via Forest roads 206, 437 and 1562. These roads are used to access the trails described above and to access, day use, undeveloped streamsides along Hayden Creek. These roads are mainly used as transportation routes to other points in the District, especially the North Fork of the Coeur d' Alene River which lies east of the Hayden Area.

During the winter season when snow has closed the roads to wheeled traffic there are several trailheads and roads important to the snowmobile program. They include Forest roads 437, 406 and 206. The snowmobile trailhead is located at the junction of Forest roads 206 and 437. While not the most popular trailhead, it is important as it disperses use among the limited number of trailheads in the Coeur d'Alene River Ranger District. There are a total of 28 miles of snowmobile trails in the area.

Virtually all road access to the area from the west is funneled into the Hayden Creek drainage. There is a great deal of day-use recreation occurring in the Hayden Creek drainage and associated tributaries. Overnight camping was prohibited along Hayden Creek in 1985 to deal with growing problems with residential camping, litter, sanitation and other camping-associated problems. Common recreation activities occurring in the area include ATV use on old roads, motorcycle riding on trails, hiking, picnicking, target shooting and forest product gathering.

Hayden can be regarded as a recreation urban interface area. Suburban development is occurring adjacent to National Forest boundaries. Former open lands are quickly being subdivided, which forces more recreation uses onto National Forest lands. While the Hayden area is not distinctive in scenery or in recreation opportunity, it serves as a conveniently accessed place to engage in outdoor recreation close to residential communities.

There is no recreational fishing opportunity within the area due to closure of all fish-bearing streams by the Idaho Fish and Game to protect wild trout spawning. Fishing is enjoyed on Hayden Lake. The most common fish taken from the lake include westslope cutthroat trout, rainbow trout, crappie and yellow perch.

Coeur d' Alene Lake Area

The Coeur d' Alene Lake Area forms the "backyard" of the communities of Hayden, Dalton Gardens, and Coeur d' Alene. It also is the eastern scenic front for the northern third of Lake Coeur d' Alene. The principle road access into the area is from Nettleton Gulch road, Fernan Lake road, Wolf Lodge Creek road, Forest roads 3097 and 614 (at Fourth of July Summit) and the Beauty Creek road.

There are a variety of recreation facilities in the area. Beauty Creek Campground is located near the mouth of Beauty Creek on Highway 97. This is a very popular campground, averaging nearly 7,000 visitor days in a site with only 15 units. Occupancy is nearly 97% during the high season of June to Labor Day. The Bell Bay Campground is located adjacent to Lake Coeur d' Alene three miles north of the town of Harrison. It is a 30-unit facility that sees about 4,500 visitor days per season from May to September and a high season occupancy of about 50%. There is a small 4-unit picnic ground located near the summit of Mt. Coeur d' Alene. The site also features a viewpoint that overlooks the lake and the City of Coeur d' Alene. Trails in the area include the Marie Creek Trail (#241), which is 4.7 miles in length and is open to non-motorized uses only. This trail will eventually be expanded to 13 miles by a combination of new trail construction and use of old logging roads to form a loop system. Much of the Marie Creek Trail travels through a pristine-appearing environment along Marie Creek. It is highly valued by people for the undeveloped, pristine recreation experience it affords, yet is only a 30-minute drive from downtown Coeur d' Alene. Other trails are the Caribou Ridge Trail (#79), Beauty Carlin Trail (#257) and the Pleasant Creek Trail (#227). Combined, these trails form a 14-mile partial loop around Mt. Coeur d' Alene.

A unique trail system was recently developed in the Canfield Mountain vicinity. The Canfield Trail System was constructed in 1990-1991 with funding supplied by the State of Idaho Off-Road Motor Vehicle Fund, Forest Service recreation construction funds and supplemental funding from the Forest Service's Knutsen-Vandenburg timber sale trust fund. This 32-mile trail system was constructed in response to public concern over unregulated motorcycle use in the Canfield Mountain-Nettleton Gulch vicinity. Well over a hundred miles of unplanned trails existed in the area due primarily to unguided motorcycle riding. The segment of public utilizing trails for motorized recreation also strongly supported the need to develop a trail system to both regulate use as well as supply a challenging system of properly maintained trails for motorcycles and other uses.

The trail system incorporates some of the best existing trails, converted old logging roads into trails and constructed 6 miles of new trail to link the facilities together to form loops and connections to trailhead parking sites. Also many miles of trails created by cross-country riding were rehabilitated to reduce soils erosion. A brochure was produced that contains a trail map and profiles grades and classes trails for difficulty level. Orientation signs and trail markers were installed to help recreationists navigate their way along the various routes. Parking at trailheads was improved to accommodate more vehicles and at Nettleton Gulch the access road to the parking area was upgraded. Approximately $120,000 was invested in this development from the combined sources.

The Canfield Trail System has been extremely popular with the public. There are well over ten thousand visitor days associated with the trail system. Motorcyclists use the trails extensively, as was intended.

Mountain bike riders, though, have also adopted these trails and are almost as numerous as motorized users. Horseback riders and hikers also use the trails, horseback riders especially favor the trails on the eastern half of the area. Efforts directed at minimizing unauthorized trail riding and limiting erosion have been reasonably successful, enough so that most public complaints concerning out-of-control riding have stopped.

A trail associated with the Canfield System is the Canfield-Huckleberry Trail 28 that gives users in the area an opportunity to travel to the summit of Huckleberry Mountain. There are plans to extend this trail for 5 miles to the north to connect with other trails in the Spades Mountain vicinity so recreationists can make longer rides beyond the Canfield area.

In the winter season, the Coeur d' Alene front becomes the gateway for snowmobile riders. Fernan Saddle features a snowmobile trailhead parking area that is utilized by thousands of snowmobile operators each season. Fernan Saddle is the principle snowmobile access on the Coeur d' Alene Ranger District and was reconstructed by volunteers and through State of Idaho snowmobile grant funds in 1998 at a cost of $70,000. Another main snowmobile trailhead is located at 4th of July Summit with a parking facility that is plowed by the State of Idaho Department of Transportation. The two afore mentioned trailheads provide access to approximately 70% of the 20,000 visitor days for snowmobiling estimated for the 350 miles of trail groomed by the Kootenai County Snowmobile Groomer Association.

Snowmobile trails in the analysis area include Forest roads 259, 413, 434, 612, 1535, 1562 and 3097 for a total of 48 miles of trail which are also among the most heavily used trails on the Ranger District.

Another winter season use in the area is located just south of Fourth of July Summit. This is a cross-country ski trail system. The trails follow old roads, are marked with trail tags and signed at junctions. The Panhandle Nordic Club provides grooming services and maintains a warming hut. This system is part of the State's Park and Ski program which generates funds for ski trail maintenance through the sale of ski-area parking stickers.

Other recreation in the Coeur d' Alene area includes a shooting range under special use permit located at the base of Fernan Hill just south of Forest road 268. This is a private club operation, open to membership for a modest fee. There is also a free informal public shooting area adjacent to the facility. Members of the club maintain the public range. There is also a considerable amount of public target shooting occurring along Forest road 268 whereever there is adequate room to set up targets. Target shooting is a heavy recreation use in the Coeur d' Alene area in general.

There is limited recreational fishing within the area in small streams. There are over 30,000 sport fishing visitor days on the lake and it is an important element in the tourism economy of Kootenai County.

Off-road motor vehicle use is also a large and growing activity in the area, indicative and typical for the urban interface front. Jeeps and all terrain vehicles are using old roads, fire lines and logging trails throughout the area. This activity is largely unregulated due to limited funding in the ranger district's recreation budget.

Urbanization of the District's front is a growing management challenge as urbanized populations have many non traditional expectations for recreation and general land management on National Forest.

Chain Lakes Area

There are several boat launches and picnic grounds in public ownership located along the Coeur d' Alene River and the associated lowland lakes that form a chain along the river. They are located on Rose Lake, Killarney Lake, Cave Lake, Medicine Lake and Thompson Lake. Boating and fishing along this waterway is a very popular activity.

There are no other recreation facilities located within the Chain Lakes Area itself. Most recreation occurring here is like other general forest areas, with hunting being the key use. Near Blue Lake there is a large "dude" ranch operation that has a special use permit to provide trail rides, camping, and hunting activities on National Forest land. Most of this activity occurs in the Cottonwood Creek drainage and in the vicinity of Swan Peak.

The main access to the area is provided by Forest road 614 which follows the long divide ridge that separates drainages of the chain lakes and Beauty-Carlin Creeks.

Bumblebee Area

This area features the Bumblebee Campground located at the junction of Forest roads 209 and 796. The campground contains 29 units and sees approximately 5,500 visitor days during its open season from mid-May to late September. There are also 18 undeveloped (dispersed) camping sites located next to the Little North Fork Coeur d' Alene River in this area. Group camping is popular in the Bumblebee Meadows area near the river; so much so that the meadows are being managed to provide recreation while protecting fragile meadow soils. The main road in the Area,(#209) is used to access the recreation sites above and is heavily used by people to reach many more riverside recreation sites further north outside the Bumblebee Area.

Fishing is popular for trout species in the North Fork of the Coeur d'Alene River. There are limited fishing opportunities in Bumblebee Creek and Little Bumblebee Creek for trout.

In the winter, Forest road 796 becomes a snowmobile trail for 9 miles total in the area. The junction of Forest roads 209 and 796 also serves as a snowmobile trailhead parking for about 8 vehicles. The Shoshone County snowgroomer is responsible for intermittent grooming of the Bumblebee loop trail.

Steamboat Area

There are no developed recreation sites in this area, but there are several dispersed camping sites located along Steamboat Creek on Forest road 400.

Forest roads 260, 400 and 900 form the Steamboat snowmobile trail, totaling 27 miles. About five miles of the loop trail is within the analysis area. The snowmobile trailhead at the mouth of Steamboat Creek is a primary jump off for Shoshone County Snowmobilers as it provides ready access to many miles of trails groomed jointly by the County groomers.

Hart Area

Within this area there is a 4-unit picnic ground at Avery Creek, which is also a popular launching point for float tubes and rafts in the summer season. Another floating launch and picnic ground is located at the road bridge for Forest Highway 9, midway between Babins Junction and Prichard. This site is named Prichard Bridge and features 3 picnic sites and a parking area for 20 vehicles for float-boat launching.

The North Fork Coeur d' Alene River is a major focus of recreation in the area for floating, fishing and camping. Fishing is strictly regulated for cutthroat trout and rainbow trout. A fishing pond is planned for a river meander pool where the need for catch-and-keep fishing demand can be met. This site is located at the

mouth of Clee Creek. Forest Highway 9 bisects the area and is used to access many more developed and undeveloped recreation sites on the River.

There is a recreation cabin located at Avery Creek that is being readied for public rental in the near future and a short trail leading from the cabin up Avery Creek features some old log flume remains.

ENVIRONMENTAL CONSEQUENCES

Methodology

The evaluation of the effects to the recreation resources can seldom be measured quantitatively. Often qualitative judgements of the effects must be made. Many of the effects of the proposed alternatives on the recreation resources were based on observations, training, personal contacts with recreation user groups , research regarding visitor attitudes and expectations, as well as the use of best professional judgement by the District Recreation Specialist and the Interdisciplinary Team.

It is possible to measure effects more quantitatively on the following items:

- *Temporary or long-term impact to developed recreation facilities.*
- *Effects on District trails.*
- *Effect on District snowmobile trail system (winter season, snow-closed roads)*
- *Effect on access to recreation opportunities and facilities by road.*

Direct, Indirect and Cumulative Effects at the Analysis Area Scale

Effects Common to All Action Alternatives

No developed campgrounds, picnic grounds or boating areas would be affected under any alternative. The beetle outbreak has not affected developed sites to an extent that would necessitate action within their boundaries. Normal developed-site vegetative maintenance regimens will suffice to deal with insect problems.

Presently, all six analysis areas are classified in the Recreation Opportunity Spectrum as "roaded natural" appearing. That classification would not be changed under any alternative. Within all six areas, a number of roads exist – ranging from those usable by automobiles, to many that are partially or totally closed by brush or constructed barriers. There are fairly numerous timber harvest units varying in age from a few years old to several decades. Logging units range from partial cut sites where scattered stumps are the only evidence of timber harvest to clearcuts. Some clearcut units may be well regenerated with immature trees, while others are still dominated by brushy vegetation. Ample opportunities remain to enjoy outdoor recreation activities in a partially human-modified environment that still contains a high degree of naturalness.

Many miles of roads would remain open to normal vehicle travel. Access via roads would be maintained to all developed recreation sites and National Forest system trails. Some roads would be closed to normal vehicle travel and/or restricted to non-motorized travel. Opportunities to enjoy the variety of recreation pursuits described earlier would remain, although some roaded accesses to sites would vary from current conditions.

There may be temporary interruption of recreational road travel within some portions of the analysis areas due to logging operations or other management activities. Generally this is a short-term disruption of less than two months.

All-terrain vehicle travel opportunities would continue to be available on old road systems.

There are no restrictions against people entering National Forest lands in any of the six areas, with the exception of possible short-term restrictions in active timber harvest areas for the purposes of public safety. Dust, smoke from prescribed fires, equipment and machinery noise including helicopter operations are possible temporary conditions under all action alternatives.

Under all alternatives, hunting opportunities would be maintained with access by road and off-road travel.

Under all alternatives recreational fishing opportunities would be maintained and largely unaffected.

The opportunities for recreational gathering of forest products, (berry, mushroom picking, etc.) would be retained. Some road accesses to various areas might be temporarily interrupted and some road access may be altered by road rehabilitation actions.

Alternative A

Selection of the No Action Alternative would not have any effect on developed recreation facilities and would not affect the ROS class in any of the six analysis areas. In areas where beetle-killed trees surround recreation trails, there could be a slightly higher cost for maintenance incurred as more than a normal amount of deadfall might be found on trails for several years.

Openings in the timber cover will occur from the beetle attacks. These openings will be difficult to travel through by any means due to down timber, thus limiting recreation opportunities.

The danger of possibly larger wildfires due to elevated fuel conditions could threaten recreation facilities and opportunities throughout the Coeur d' Alene River Ranger District.

Recreational fisheries would be unaffected, unless a large wildfire were to occur.

Alternative B

Hayden Area

Timber harvest and post-harvest treatment of slash by burning in some units would probably temporarily disrupt recreation use of the Bud Howard Trail 29. Interruption of use would only be necessary during actual operations in the selective harvest unit that overlays the trail.

Snowplowing may occur along roads designated as snowmobile routes. Existing trailheads for snowmobile access would remain available. Snowplowing would be prohibited where it would completely eliminate trail access from identified trailheads. Approximately 24 miles of snowmobile roads - trails might be interrupted for one winter season. This includes routes on Forest roads 206 and 437.

Coeur d' Alene Area

It is probable that public use of the Canfield Huckleberry Trail 28, Beauty Carlin Trail 257 and the Caribou Ridge Trail 79 would be temporarily interrupted by timber harvest activities in units that overlay these trails.

Work on extension of the Marie Creek Trail 241 to complete a loop route may be temporarily interrupted by harvest operations. Additional slash and debris may be left within the projected trailway. This projected trailway was identified in the Horizon Environment Impact Statement and Record of Decision (1991).

The Canfield Trail System would be affected in the following manner: all trails to the east of north-south Trail 9 would be temporarily closed to allowing logging and log haul operations to occur in the Stacel Draw

vicinity. Road construction necessary for the logging of three units would necessitate some minor relocation and reconstruction of Trails A and B and Trail 10 (2.5 miles). A helicopter log landing would be needed at the "shooting range" trailhead parking area, which would completely interrupt use of the parking site for the duration of the helicopter flights and until slash and debris could be disposed of. It's likely that some signs and markers located on the aforementioned trails would be damaged or destroyed and require replacement.

Helicopter overflight and proposed logging units in the vicinity of the Fernan Rod and Gun Club might necessitate temporary suspension of gun range activities for a short time, likely less than two weeks. Timing of this activity would need to be coordinated with the Gun Club.

There are several logging units proposed near the Hidden Creek Ranch. Planned activities under Forest Service special use permit may be temporarily interrupted by logging activities. Planning of harvest operations would need to be coordinated with the Ranch administrators.

Snowplowing could occur on roads designated as snowmobile routes, but would be unlikely because of the location of the proposed harvest units. If plowing would occur, approximately three miles of Forest road 1535 from the 1562 junction to Fernan Saddle would be interrupted for a winter season. Parking spaces at the Fernan Saddle trailhead would see about 30% space reduction during weekdays. The trail head would remain functional and open through any possible operations.

Chain Lakes Area

There would be no direct effects to recreation in the Chain Lakes Area beyond what is identified in the "Effects Common to All Alternatives" discussion above.

Steamboat-Bumblebee Areas

It is possible that there could be snowplowing to facilitate log haul on Forest roads 796 and 400 which are designated snowmobile routes in the winter. The effect of plowing of these routes would be to eliminate all access to snowmobile trails in the Bumblebee Area for one winter season.

Hart Area

There would be no direct or indirect impacts to identified recreation opportunities in the Hart Area.

Alternative C

The direct and indirect effects of this alternative would be similar to those outlined in Alternative B. No new roads would be constructed in this alternative. Logging units would remain but logging systems might change in units not served by roads proposed in Alternate B. The only difference between Alternatives C and B would be that effects to the Canfield System Trails would be less under Alternative C, as road construction would not damage Canfield Trials A, B and 10. Trail relocation would not be necessary, although trail clearing and minor reconstruction might still be necessary.

Alternative D

The direct and indirect effects of this alternative would be similar to those in Alternative B, but the expanded harvest units would have the following added effects:

The Canfield Trail System (Coeur d' Alene Area) would be totally closed (32 miles) for a time due to the addition of two units in the western end of the area. These units overlay Trails A, 3 and 6. Further, the trailhead parking area at Nettleton Gulch would be utilized as a helicopter landing, making it unusable by

the public until it can be cleared of debris. Additional harvest in the east side of the trail system would prolong the closure period for the affected trail segments and the parking area at the shooting range.

The addition of Unit 272 would further affect the Hidden Creek Ranch special use permit, as it overlays a trail used by the Ranch during the summer. Noise from operation would be the greatest effect on guests of the ranch. Closures or restrictions for safety could also cause temporary disruptions of trail use.

Collectively, the expanded harvest would increase the amount of time that various recreation opportunities and access might be disrupted.

Alternative E

The effects of this Alternative are essentially the same as Alternative B.

Alternative F

Prescribed burning would have about the same disruptive effects as the proposed timber harvest, which includes some fuel treatment as well. The interruption in recreation activities and opportunities might be of slightly less duration than that in timber harvest alternatives (B, C, D and E). The effect would be different in that burning is less likely to damage facilities as mechanical logging operations.

Alternative G

Prescribed burning proposed in this alternative would have similar effects as that proposed in Alternative F. This Alternative would close more non-system roads by culvert removal and obliteration where these roads intersect with main collector roads. The direct and indirect effects would be similar to other action alternatives but without timber harvest activities and the temporary disruptions anticipated. The ROS condition of roaded and natural appearing would be retained but there would be fewer old roads in the project areas that would have drainage structures intact.

Cumulative Effects at the Coeur d'Alene Project Area Scale

The possibility of increasing use of the six analysis areas by all terrain vehicles (ATVs) exists under all action alternatives. ATV use has greatly increased on the Coeur d'Alene River Ranger District in the past decade. The pattern of use of ATV's has included use of logging roads, log skid trails and firelines. It's likely that new developments of this kind would be used by ATV's and possibly larger sports utility vehicles.

There is a possibility of reducing the availability of ATV miles in the analysis areas through the proposed actions of road rehabilitation which would remove drainage structures and partially obliterate short segments of roads. Road rehabilitations proposed would inhibit access and use of old roads by ATVs.

The opportunity to enjoy recreational activities in a roaded but natural appearing wildland setting would be retained in any alternative. ROS standard, "Roaded Natural Appearing."

Various operational activities within the six analysis areas could temporarily displace some recreation activities into other parts of the Coeur d'Alene River Ranger District or other wildland areas where outdoor recreation is permitted.

Effects of Opportunities

Coeur d'Alene Area

It may be advantageous to relocate approximately three miles of trail in the Canfield Trail System to provide better routes, less modified scenic conditions and easier maintenance.

Hayden Area

Relocation of Trail 29 to allow easier access and maintenance - 2.5 miles. An ATV trail system using logging roads might be developed if the need is identified and funding is available.

Bumblebee, Chain Lakes, Steamboat and Hart Areas

No project-related activities are anticipated.

Consistency with the Forest Plan and Other Regulatory Direction

Recreation Standard 1: Continue to provide a share of recreation opportunities: This standard shall be met under all alternatives.

Recreation Standard 7: Provide a broad spectrum of dispersed and developed recreation opportunities: This standard would be met with all alternatives.

Recreation Standard 8: Treat and maintain timber stands in a manner compatible with recreation objectives: Current recreation objectives within these areas would be maintained under all action alternatives. Potential for future recreation developments and programs would be unaffected.

Recreation Standard 10: Trails would be managed in accordance with management area requirements: the No Action Alternative would have no effect on trail management. Under all action alternatives standards would be met for trails in all management areas.

SCENERY

REGULATORY FRAMEWORK

Scenery management direction for the analysis area is contained in the IPNFs Forest Plan (1987) and is described in terms of Visual Quality Objectives (VQOs). VQOs were established during the Forest planning process and were mapped by computer. The mapping was based on the seen area from sensitive travel corridors and other features having a high visual sensitivity level. Visual Quality Objectives were assessed using guidelines contained in the Visual Management Handbook, Chapter I of the National Forest Landscape Management Series (USDA Forest Service 1974). The system was revised and is now known as the Forest Service Scenery Management System. The revised guidelines are contained in Landscape Aesthetics, a Handbook for Scenery Management.

AFFECTED ENVIRONMENT

Characterization

Overall, the scenic character of the analysis area through time has been a forested environment with a mixture of tree species. The primary cause of changes to the landscape character historically has been caused by large stand-replacing fires which covered portions of the project area. Human uses have altered the scenic integrity from historic conditions by homesteading, development of transportation systems, logging,and other activities. The composition of the forest also has been altered by the lack of fire in the environment over the past several decades, resulting in a much higher percentage of Douglas-fir, grand fir, and other shade-tolerant species than historic conditions.

Forest users place a high value on scenic integrity. Scenery plays a major role in the attraction people have for the land and in the special feelings the area invokes.

Existing Conditions

Importance of Scenic Landscapes

Research shows that there is a high degree of public agreement regarding scenic preferences. This research indicates that people value most highly the more visually attractive and natural appearing landscapes. People travel thousands of miles and spend a great deal of money to look at natural scenery. Natural settings provide an essential setting for many recreational and tourist activities throughout the world. Natural landscapes are important sites for permanent residential developments. A home with a good view of mountains, forests, lakes, seashore or rivers is valued higher than an equivalent site without such views. One of the major factors stimulating rapid population growth in northern Idaho is the nearness of a natural-appearing mountainous and forest environment. The economic vitality of the area is at least in part dependent on the maintenance of scenic landscapes.

People cannot always distinguish between natural landscapes and those resulting from historic cultural alterations. The highlands of Scotland are valued for their stark beauty, although the present landscape is the result of centuries of deforestation for human needs such as heating fuel and building material for homes and fortresses. Obviously, human-influenced landscapes like pastoral settings are accepted as the normal character of many regions and visited by many people just for those scenic attributes.

Other human values often compete with the sources of natural beauty. The same elements of the ecosystem that afford natural beauty may also stand in the way of the space, material and energy required for development or other human needs and enterprises. Decisions must frequently be made whether to preserve some particular elements of the natural environment as sources of natural beauty, or to remove or alter them in the interest of other purposes. In most cases the choice is not all or none, rather it is more a matter of balancing some level of natural beauty against some level of use for other purposes (Daniel 1991).

One of the main goals of managing scenic conditions on National Forests is to maintain natural-appearing landscapes characteristic of the existing landforms and to establish the values people place upon the scenic attributes of an area. The challenge, to a large degree, is to maintain the visual character of an area while managing other multiple human uses of the forest.

Scenic Characteristics

Hayden Area

National Forest lands form the scenic backdrop for Hayden Lake. These lands form a long arch of forest-covered mountainous terrain that reaches from the south end of the lake, to the east and on to the north. Looking at the National Forest lands from the Lake surface or from the western shoreline and bluffs along the Lake, these lands form middleground views. Middleground distances range from 1/2 to 4 miles. Human activities seen from this perspective can contrast fairly vividly with natural scenery. At this distance, people can distinguish individual tree forms, rock outcrops and small openings in the forest canopy. The scene is given its texture and color by the extensive tree cover on the terrain. Trees in the area are almost entirely coniferous, mostly fir and pine. This makes for an unchanging color pattern of dark green. Color differentiation is provided by hardwood brush species such as alder and maple. The brush provides fall colors in yellows and reds. There is only a limited amount of color-changing western larch on the land to vary the tree color scheme.

National Forest lands form the middleground of an overall scene that includes Hayden Lake which is a fairly large, 5,000 acre, lake. The lake features many bays and a rough forested shoreline. The shoreline of the lake is highly developed with summer cabins, permanent homes, many very large; boat docks, marinas, stairways, tramways, roads and a summer camp. The south shore of the Lake features tract housing, a country club and condominiums prominently in view. Boaters on the lake and many residences on the east shore can see water towers within the City of Hayden. The overall scene including the Forest background is visually pleasing and highly valued but is not pristine by any means.

National Forest and some privately-owned lands that make up the middleground and background to the overall scenic condition of the area appear to be relatively undisturbed by human activities compared to the busy Lake shorelines. In fact much of the forested land has been subject to timber harvest and road development. Several recent timber harvest areas are plainly visible to the north, as are several within the Yellowbanks Creek drainage. There are many small, natural openings in the tree cover due to thin topsoil sites, rock outcrops, wind and ice damage, tree killing diseases and insect blights.

Visitors to the Forest in the Hayden Area can travel numerous roads, some maintained as part of the National Forest transportation system, and other old logging roads in varying states of vegetative regrowth. There is ample evidence of timber management, most evident in regeneration-harvested areas. The most valued places in the area for recreation visitors, such as along the East Fork of Hayden Creek and the Chilco Mountain Recreation Trail, have a high degree of scenic integrity despite the long history of timber harvest and some mineral development in the area.

Coeur d' Alene Area: This is a fairly large area that varies in its scenic value. Most significantly the western slopes of the area south of Interstate 90 are important for background views for boaters on Lake Coeur d' Alene and some residences along the shorelines on the upper half of the Lake, including the City of Coeur d'

Alene. Background distance is generally 4 miles away from the viewer on out to the horizon. At this distance, people can distinguish stands of trees, large openings in forest cover and very large rock outcrops. Texture is not noticed, color is flattened and landform ridge lines and horizon lines are the dominant visual characteristic of the area.

Large openings in the tree cover as viewed from afore-mentioned viewpoints are the result of human activity on the land. At the base of the steep mountain side there are large acreages under cultivation for hay farming. On the hillsides there are openings created by timber harvest. Most of these openings are fairly natural looking in shape and size and could be interpreted by many viewers as natural. The overall view, including middleground and foreground views, is of privately owned lands that feature home developments, boat docks, condominiums, roads and power lines. The value people place on the scenery is like that in the Hayden Area. While not pristine, Lake Coeur d' Alene is regarded as one of the most scenic lakes in the world.

Another important viewpoint is the land seen from the primary travel corridor through the Area -- Interstate Highway 90. Views of the area from the highway are mostly in the foreground; distances from 0 to 1/2 mile away from the viewer. At these distances people can distinguish individual plants, tree trunks, wildflower groupings and branches of trees. Interstate 90 travels through a rocky canyon with most of the above features. Scenic integrity is also important on road travel corridors in Beauty Creek and the Beauty Creek Campground where views are mostly foreground. The Fernan Hill and Windy Ridge roads, (numbers 268 and 612), provide down-canyon views of forested lands that range form foreground to background. The Marie Creek Trail #241 offers a primitive setting virtually undisturbed by human development with forest canyons and large rock formations.

The general scenic characteristic of the area is of fully-forested, round-mountain terrain. This landscape is highly dissected by numerous streams. Color and texture of the forest is fairly uniform due to mainly coniferous vegetation. Some color variation is provided by brush species and western larch. Evidence of timber harvest activities in the area is present throughout the area. Logging has occurred in the area since the late 1920s. Recent logging made ample use of road-based transportation networks and regeneration-type harvest was used extensively. The overall visual effects on the area is one of having been modified considerably by forestry management. Many of the older harvest units were planted and now are recovered enough to greatly reduce the effects of past logging on the scenic quality in the area.

Chain Lakes Area

The Chain Lakes area derives its name from the unique link of river, lakes and wetlands formed along the lower reaches of the Coeur d' Alene River. This is a highly scenic valley distinguished by a highway that is part of the national scenic byways program. State Highway 3 is also known as the "White Pine Scenic Route". The National Forest lands in the area form a middleground backdrop to the overall scene that includes the lake and stream, as well as cultural features including, rural homes, cultivated fields, roads, power lines and bridges. The National Forest lands play the same role in the scenic integrity of the area as previously described as middleground. These mountainous areas are forested but there is a fair amount of naturally-occurring openings with a low shrub vegetative cover. Timber harvest areas are also visible -- all of which are on private lands or State-owned land. The landscape in this area overall is very pleasing and rustic.

Bumblebee Area

This area forms a small part of the important scenic corridor along the Little North Fork of the Coeur d' Alene River. All the lands along this river valley are public; therefore, views from private homes and associated high value property are not a concern. Instead, the scenic importance of the area is that of recreation visitors that travel along the valley Forest road 209 and river-based recreation activities where the surroundings are part of the experience.

Views from the river and adjacent road are largely in the foreground, featuring the swift moving river, rock formations, forest made up of mixed conifers and numerous broad leaf black cottonwood trees. Occasionally, middleground views are seen from the road. There are some unmistakable timber harvest units within these views. Overall, though, there is a high degree of naturalness about the river valley.

Steamboat Area

Steamboat Creek is a middle size tributary of the North Fork of the Coeur d' Alene River. Its crosshatches resemble those described in the Bumblebee Area, but on a smaller scale. Visual concerns, while not as high as along the main river corridors, are still similar. Views in the area are all foreground with the stream and close canyon walls setting the scene. As one leaves the canyon by road, the visual conditions become more to the middleground with a landscape that has been highly modified by past timber harvest.

Hart Area

This area involves two distinct areas of visual sensitivity. A few small units adjoin the corridor of the North Fork of the Coeur d' Alene River. This river virtually defines the ranger district that is its namesake. It is visually distinctive featuring a wide rapid-filled river, and large tiered rock cliffs unique enough to be given special place names. Most of the river corridor is shaded by black cottonwood trees and mixed conifer forest. Many of these stands of trees rate as old growth. There is a significant component of western larch trees in the valley that bring spectacular color in the fall season. These attributes bring many people to the area. A high quality forest highway follows the river corridor, facilitating recreation uses of many kinds. Views are mainly foreground, but in a number of places do open to middleground. Timber harvest units come into view from time to time as one travels the river, but they are for the most part subdued and infrequently seen. The portions of the river below Prichard are largely in private ownership and add cultural influences to the view including rural homes, trailer parks, power lines, commercial establishments and roads.

The other portion of the Hart Area to consider is the Beaver Creek drainage. The creek is a significant tributary of the North Fork and is paralleled by a road that serves as the main tie between the community of Wallace, Idaho and the river. The valley bottom is mostly privately owned and settled with rural homes and small farms. The slopes adjoining the creek bottom are forested with mixed conifers and fall into mainly foreground views. Timber harvest and cultural land manipulation are evident throughout the drainage. Nevertheless, the scene is rural in character and generally pleasing visually.

ENVIRONMENTAL CONSEQUENCES

Methodology

Timber harvest, road construction and fuels treatments can affect the appearance of a forested landscape due to contrasts created between natural appearing landforms and vegetation, and those modified by management activities. These changes are often expressed in artistic terms of form, color, line and texture. Contrasts are created by human induced changes in vegetative cover and soil disturbances.

The ability to control how management impacts will appear when viewed with an artist's critical eye depends on the silvicultural system employed, logging techniques, terrain orientation to viewers, and logging slash disposal methods and completeness.

The appearance of the analysis areas today is quite different from what one may have seen in the early 1900s, before much of the dramatic human influence on terrain including logging, cultural activities, settlement development and forest fire control began in earnest. Pre-1900s photographs and written descriptions, as well as dendrological study, paint a picture of a forested landscape somewhat different from the existing condition. Instead of today's' uniform, thick blanket of trees, the nineteenth century landscape was far more diverse. There were much larger numbers of western white pine, ponderosa pine and western larch. The overall appearance was of more open stands of timber, larger trees in both height and diameter, and more diversity in color and texture. Uncontrolled fire created a patchwork of openings in the timber, far more than one observes today.

One objective of scenery management for the long term would be to reintroduce a more representative mix of the long-lived trees and timber stands more "natural" to the region. Accomplishment of this goal presents unacceptable social effects. For instance, most people who live here now would not accept a policy of letting wildfires run their natural course with no attempt to suppress them. Nor will people accept widespread clearcut logging to artificially open the land where, as with fire aftermath, trees could be planted and tended so that eventually, in a hundred years or so, things would more resemble prehistoric conditions.

The goal, therefore, of scenery management will be to maintain, generally, the views people now enjoy from the key points of high visual sensitivity previously identified in the existing condition portion of this document. Where there is an opportunity, planting would introduce a tree component that would help to diversify color and texture in the stand. Small openings created on timbered slopes would be in scale with existing naturally created openings and be irregularly shaped. The employed systems are evaluated as to their effects to visual quality as viewed from key viewpoints. Effects of burning are similarly evaluated.

The methodology in evaluating the effects of the various management proposals for the areas involves the following premises:

1. **Determine the value of the scenic landscape to people.** This "landscape visual sensitivity" has been mapped and is contained in the Idaho Panhandle National Forest Plan Visual sensitivity is a combination of established key viewpoints and the scenic attractiveness of the viewed area. It must be noted that it is not possible to evaluate the scenic condition of the area landscapes from every possible viewpoint of concern to people. Selected key viewpoints are representative of views enjoyed by most residents and visitors to these places.

2. **Determine the scenic character of the landscape.** This is expressed as "scenic integrity levels". These levels are rated as *Very High*, with a goal of preservation of the scene; *High*, with a goal to retain that quality; *Moderate*, the goal is to partially retain the view: *Low*, views can be modified to an extent; and *Very low*, the condition of the landscape is, and can continue to be highly modified by human manipulation of the land and vegetation, and vegetation.

3. **Determine the ability of the landscape to absorb human alterations without loss of landscape character and without reduction of scenic character.**

4. **Determine how much of the landscape is visible from key viewpoints as well as what portions of the landscape are hidden (views blocked by terrain).**

5. **Utilize computer aided graphics to determine how timber harvest might affect the appearance of the landscape in the most sensitive viewed areas.**

6. Determine a desirable future condition for scenery in the Areas.

The existing scenic condition of privately owned or other public agency lands is considered in the overall visual effects of applied management on National Forest lands.

Fire, and smoke from fire; helicopters and logging equipment are considered a short term and temporary impact on scenic integrity and are not considered in the effects analysis.

Direct, Indirect and Cumulative Effects at the Analysis Area Scale

Effects Common to all Action Alternatives

The highest level of scenic integrity in all analysis areas is considered *moderate*, requiring a goal of partial retention (management activities remain visually subordinate to the characteristic landscape). In each alternative, portions of timber harvest units *may be seen* from key viewpoints. Burning and fire effects may be seen from key viewpoints. The size and shapes of units are similar for each alternative and would have similar visual effects. Each analysis area also contains landscape not visible from established key view points.

All landscapes in all alternatives have been to some extent modified by past management activities. Some of these disturbances are not readily evident to casual viewers.

The scenic attributes of the landscape for all areas are considered to be common, or typical, for mixed conifer forest lands in northern Idaho.

The scenic condition of the landscape is constantly changing, whether influenced by natural processes or human manipulations.

Mechanized operations potentially could introduce noxious weeds into the areas. The visual effects of weed introduction are limited to foreground views. Weeds presently exist in variable quantities and species in all areas. Noxious weeds may compete with native plants and even dominate foreground views along roadsides. Weeds can compete with native wildflowers. Some weed blooms are considered visually pleasing; in fact several noxious invaders that have been identified in the Coeur d' Alene were imported as ornamental plants. The extent of weed impacts to scenery is dependent on the extent of suppression effectiveness.

Alternative A

In this alternative no action would be taken to deal with trees that have been attacked and killed, or are dying from attacks by the Douglas-fir bark beetle. There would be no attempt to deal with continued beetle infestations other than small scale tree salvage operations, (out of the scope of this analysis).

The effects of the present beetle infestations are readily visible from most of the key viewpoints identified in the Existing Condition portion of this document. Affected locations are characterized by groups of brown or red needles in trees that have died or will be dead within a few months. These groups are fairly sizable; large enough to be easily viewed from middleground distances. Field crews examining infected stands of Douglas-fir trees in the fall of 1998 also report that many infested trees have not yet shown the effects of the attack in their foliage. There is also a strong possibility that the beetle activity has not run its course, so it can be expected that a significant number of trees that have not yet been infested will be by the summer of 1999.

Trees with reddened crowns have a temporary visual effect. In time, these infected pockets of trees will lose all their needles and become openings in the timber cover. There are also additional natural effects occurring on the landscape. Openings in the tree cover have been appearing in stands of Douglas-fir and grand fir due to mortality from root disease fungi. Pockets of root rot-killed trees and openings caused by the diseases are endemic to all the areas involved in this analysis. Cumulatively, the combined effects of insect infestation and

disease are creating many visible openings in fir-dominated forest land in north Idaho. These effects are visually evident but do not necessarily degrade the scenic attractiveness of the landscape. Instead of uninterrupted blankets of trees there are numerous small clearings that create a mixed pattern of openings and dense timber with color differentiation in all seasons of the year.

Another consideration for this alternative is the visual effects that may be engendered by the increased possibility of large scale wildfire upon the scenic integrity of the landscape. Selection of the no action alternative does impose a higher risk factor for large wildfires. Increased fuel loadings elevate the possibility of such an occurrence. It is not possible to analyze the scope of the effects to scenery from a major fire, but an example of fire effect is evident on the west slope of Canfield Butte to use for reference.

Alternative B

Hayden Area

The importance of the scenic condition of the middleground view to the residents and recreation visitors in this area is detailed in the Existing Condition portion of this document. The terrain closest to Hayden Area viewpoints are those that make up the northern slopes of East and West Canfield Buttes. These mountain sides are also ones that can be viewed from some points an the eastern shore of Hayden Lake. Proposed harvest for this segment of the area is selective cutting with helicopter extraction of the logs. Logs would be flown to locations on existing roads.

Selective harvest would create small openings in the timber cover of no more than one acre, with the great majority of openings being far smaller in size. In each selective harvest unit approximately 30% to 40% of the tree crowns would be removed. All trees removed would be beetle-infested Douglas-fir. Since Douglas-fir rarely makes up the total component of trees in the stands there would remain a mix of other species, mainly grand fir, western hemlock and western larch. Many Douglas-fir trees unaffected by the insect attacks would also remain in the stands.

Helicopter yarding of logs eliminates the need to construct roads across the face of the slopes, eliminating the need to consider the visual effects created by road construction and maintenance. Regeneration harvest cutting, or clearcuts, are not proposed for the Canfield face in this alternative. Regeneration harvest units are the most difficult to integrate into a natural landscape due to the lines and forms created by distinct unit boundaries. Such units often appear as squares, rectangles or triangles in shape. Nature rarely creates geometric shapes in vegetated openings. Selection harvest in the area would basically follow the course of Douglas-fir beetle infested stands. The general effects of this timber harvest would be very similar to the openings created by the progress of the beetle. Openings created in the timber by harvest, in effect, would be virtually the same as those created by natural processes.

Moving around the Hayden Area to the eastern slopes of the Yellowbanks Creek and Nilsen Creek drainages, there is more distance from viewpoints on the western shoreline and Lake surface. These drainages are screened by terrain from most of the eastern shoreline of the Lake. Select harvest units proposed for this area would be similar in effect as previously described, but with greater distance the small irregular openings could be better absorbed into the landscape. Existing openings, both natural and some from past timber harvest help integrate newly-created openings into the scene.

There are several small regeneration units proposed for the Yellowbanks and Nilsen Creek drainages. Each of these units were analyzed for their impact to scenic integrity and for the ability of the landscape to absorb the effects of regeneration units as previously described. In Alternative B, from the key viewpoints, almost all of these units would be hidden by interdicting terrain. That is landforms, ridges and mountain tops, would block the line-of-sight to the units.

Regeneration cutting units that could be seen from key viewpoints in all cases would meet visual quality standards of *Partial Retention* set for this area (management activities can be seen but remain visually subordinate to the characteristic landscape).

Proposed harvest north of Hayden Lake within the Hayden Creek drainage would be mostly masked by terrain and could not be observed from the viewpoints of primary concern. All of the regeneration cutting units would be hidden behind terrain as would the majority of selective harvest units. Those units that could be seen would appear as those previously described but have the further advantage of depth created by greater distance from the viewpoints.

For travelers using roads and trails within the Hayden Area the visual quality objective is *Modification,* (management activities may visually dominate the original character of the landscape). While visitors would certainly be aware that these areas were logged, the effect would not be out of character for the area. Selective harvest units' effects would be minimal in foreground views.

Road construction proposed for this alternative is negligible and will not be discussed further in the visual quality analysis.

Coeur d' Alene Area

There are two proposed select harvest units immediately adjacent to the Beauty Creek Campground. Views of the area from the campground are foreground. Experience with partial cutting on this slope following an ice storm salvage in 1995 demonstrated that selective harvests would meet visual quality goals for *Retention,* (management activities are not visually evident). There is enough vegetative diversity in the stands to absorb the visual effects of logging the extensively infected Douglas-fir on site.

Selective harvest units located on the upper western slopes of Mount Coeur d' Alene would be within sight of key viewpoints from the City of Coeur d'Alene and the western shoreline of Lake Coeur d' Alene. This line of ridges and summits is background to the key viewpoints and ranges from 3 to 4 miles in distance. As background views, these cutting units would blend in well with the existing landscape character and easily meet the visual quality goal of *Modificat*ion.

From the Interstate Highway 90 corridor portions of a selection cut unit in Mill Creek can be seen as a foreground view and would be unnoticed, as the beetle attacks have already opened up the stand. Select cuts and a small regeneration cutting unit near 4th of July pass are not visible from the Interstate Highway. The regeneration unit would be within the cross country ski area but would not be out of character, as many of the ski trails make use of logging roads and cutting units to provide skiing variety.

Other selection cut units in the Coeur d' Alene Area could not be seen from key viewpoints and would meet visual quality goals for *Maximum Modification.* These locations are primarily in the Beauty Creek, upper Wolf Lodge Creek, and Carlin Creek drainages.

Chain Lakes Area

All the proposed units in this area of visual concern are located in the upper reaches of Killarney Creek. The effects of the selection units in this drainage would be similar to those described for Hayden. There is a great deal of capacity for this terrain, with substantial openings as part of its existing landscape character, to absorb the effects of those parts of units that are visible from Highway 3 and vicinity. Regeneration units proposed for the Area are mostly hidden by interdicting terrain. Another selection unit on Swan Peak would also blend in with the broken nature of the landscape and meet *Modification* Visual Quality Objectives.

Steamboat- Bumblebee Area

One unit located above the Little North Fork of the Coeur d' Alene River and Forest road 209 is of concern for visual quality. It is proposed for selective harvest and as such would blend with the landscape character along the river corridor. The visual quality goal for this point is *Modification*. All other units proposed for this area would meet goals for scenery.

Hart Area

Several units located on high slopes above the scenic North Fork of the Coeur d' Alene River and paralleling the Forest road would be hidden by terrain from all valley view points of concern.

The other point of visual concern in this area is the Beaver Creek road between Babins Junction and Delta. Along the creek corridor to the north, a mix of selection harvest units and small regeneration units is proposed. These units, with the exception of one unit, fall into *Modification* visual quality requirements. These units would be mostly tucked into the creases formed by gulches and creeks tributary to Beaver Creek, thus only visible in part. In addition, most of the units would be located higher on the slopes and would be partially screened by foreground terrain. The visual quality goal for the Beaver valley is *Modification* as seen from the road and valley-bottom homes.

Alternative C

This alternative proposes no new road construction. Since roads are of negligible concern for scenery quality in this analysis, the effects of this alternative are identical to Alternative B.

Alternative D

This alternative proposes expanded logging throughout the areas. The general visual effects of the expanded selection cutting units is fully described for all areas in Alternative B. The following describes and analyzes effects that distinctly differ from those in Alternative B.

Hayden Area

This alternative proposes to log certain units with regeneration harvest. The existing condition descriptions and those as described in Alternative B explain the particulars of visual sensitivity in the area. Regeneration harvest units are sometimes difficult to blend into the surrounding landscape due to the unnatural geometric forms and lines created by tree line borders of the units. Regeneration units sometimes also create ridge line breaks that appear extremely unnatural when viewed from a distance. Middleground-viewed landform, as explained, is highly susceptible to being dominated visually by openings of strong lines and form. In the Hayden Area, along the north slopes of Canfield Butte, the dense, uniform stands of evergreen trees would probably not allow sizable regeneration units to be harvested and still meet Forest Plan standards normally required for visual quality. Regeneration units in excess of two acres cannot be adequately absorbed into the landscape without unnaturally dominating the existing scenic conditions.

Additional analyses (simulations) were completed for seven regeneration units (#s 28, 35, 39, 42, 190, 193 and 200) in the Hayden Area proposed in this alternative that would probably not meet visual quality objectives for the various reasons given above. Their position as viewed from one, some or all of the key viewpoints could compromise the scenic quality of the landscape. These units' proximity to critical viewpoints make some standard mitigation for visual effects of regeneration units ineffectual. However, effects of regeneration harvest in these units might be mitigated by helicopter logging, which would allow for irregular boundaries that can help avoid straight lines and geometric unit shapes typical of cable log yarding techniques. Visual impacts can also be muted by avoidance of fireline construction and piling and burning of slash rather than broadcast burning. Retention of some green trees within the units can also soften some of the visual effects of

the regeneration harvests in these middleground views. These features and mitigation measures have been designed into these particular units; please see Chapter II for these details.

Expanded selective harvest, including those favoring western white pine and western larch release, would meet visual quality objectives. Most of the additional selective harvest units for Alternative D would be located in the upper slopes of the Hayden Creek drainage, which can capably integrate this harvest type into the landscape.

Coeur d' Alene Lake, Chain Lakes and Bumblebee-Steamboat Areas

Proposed expanded harvest for this alternative would have little additional effect on scenery as described in Alternative B for these Areas.

Hart Area

Expanded harvest would have limited additional visual effects to those described in Alternative B, with the following exception. One unit is proposed for regeneration harvest in this alternative. This unit is in the foreground view of the Beaver Creek road and several residences, and would not meet partial retention visual quality objectives. This unit would meet VQO objectives as a selective harvest with no more than 40% crown removal.

Alternative E

Salvage cutting of dead trees would have negligible effect on visual quality of the of the landscape in any of the harvest areas. Openings created would be identical to those being created by beetle infestation. Standing dead trees or snags would be removed in advance of their eventually falling over. The beneficial effect of salvage logging would be to eliminate the less than desirable foreground views of jumbles of dead, down timber.

Alternative F

The effects to the landscape character for a regimen of prescribed fire are somewhat different from those of timber harvest. Although timber harvest alternatives do include fuel treatments by prescribed fire which have been addressed in the preceding analysis, this alternative involves additional factors.

This alternative includes many of the select harvest units proposed in Alternative B. Additional burning would be performed when the units are located on north or east slopes. Fuel treatment would be to mechanically remove slash and burn it in clearings in large piles. In some cases, slash would be flown to the burn bays.

While the overall scenery effect of this alternative would be very similar to Alternative B, there are some other considerations. Understory burning of some of the select harvest units would have a fair probability of killing or partially reddening the crowns of a few of the living trees in the units. At worst, this could cause some minor additional openings within these units. Douglas-fir trees are most susceptible to heat effects to their crowns, so those units with the largest component of this species would be most susceptible to this effect.

Fire escaping control measures or burning "out of prescription" is a risk in all alternatives but is slightly elevated in this one due to more fire applied to the land.

The visual effects of fire as previously mentioned are largely transitory. Burning can have a long-term positive effect as it can give the scenery a cleaner, more open-under-the-trees feeling that is generally appreciated by Forest visitors. Prescribed fire may also reduce the probability of large wildfire occurrence

within treated locations in the alternatives, although it is impossible to predict how this might affect landscape scenic quality.

Alternative G

There is no timber harvest proposed for this alternative and fire effects would be similar to Alternative F for all areas. Other activities proposed for this alternative would have little effect on visual quality objectives.

Cumulative Effects at the Coeur d'Alene Project Area Scale

Alternative A

Natural systems are dynamic and changing. Changes are usually subtle and occur over long periods. Occasionally these changes are catastrophic, reaping large-scale transformation of the scenic character of landscapes. The current infestations of Douglas-fir beetles are modifying the scenic conditions to a moderate extent. When the epidemic has run its immediate course, the scenic condition will be more or less changed to include additional openings in timber stands with Douglas-fir and many dead trees - both standing and downed.

The risk of wildfires burning with greater intensity due to heavy fuel loads is increased, posing a risk for more catastrophic visual effects on the landscape.

Action Alternatives

Each of the action alternatives would create enough openings in tree canopy to be noticed from the wide range of views possible in the developed areas, in valleys as well as rural residential areas on ridge tops.

Alternative D would have the greatest impact on the scenic quality of all the evaluated alternatives. Some of the units in this alternative do not meet the Idaho Panhandle Forest Plan Standards for visual quality.

Alternative G would have the least effect on the visual condition of the areas. Openings in the timber would still be evident due to the beetle infestation effects.

Topography, vegetative obstructions and the position of the viewer on the ground would determine the cumulative effect that natural and man-made openings would have on scenic integrity.

It's assumed that regrowth of trees in areas opened by timber harvest would eventually mute the effects of the action alternatives. It is also assumed that there would be further manipulation of the land and vegetation by forest management activities and that standards would be in place to integrate those activities into the landscape as it exists at the time.

Effects of Opportunities

Coeur d' Alene Area

To mitigate the effects of logging on scenic conditions from trails in the Canfield Trail System, stumps could be flush-cut in immediate foreground views from main trails in or near proposed units. Additional slash clean-up might be implemented near impacted trails.

Hayden, Bumblebee, Chain Lakes, Steamboat and Hart Areas

No project-related activities for scenery management are proposed.

Consistency with the Forest Plan and Other Regulatory Direction

Visual Standard 1 (Meet adopted Visual Quality Objectives): All alternatives meet the VQOs listed in the Forest Plan for lands involved, expect D. The Forest Plan standards for visuals state the "Exceptions to meeting VQOs may occur in unusual situations: ...Examples of some exceptions are... large areas where the mortality rate for timber is very high." For this standard, alternative D meets the Forest Plan due to the conditions of the forest and actions needed to address them.

Visual Standard 2 (Evaluate scenic resources based on visual sensitivity levels assigned to lands in and adjacent the Idaho Panhandle National Forests): All alternatives were evaluated based on visual sensitivity levels assigned in the Forest Plan. There were no adjustments of plan boundaries created by this project level analysis.

HERITAGE AND TRIBAL INTERESTS

REGULATORY FRAMEWORK

Heritage resources include buildings, sites, areas, and objects having scientific, historic, or social values. They comprise an irreplaceable resource relating past human life. The "keystone" legislation of modern heritage resource management is the National Historic Preservation Act of 1966 (amended and expanded in 1976, 1980 and again in 1992). All other heritage resource management laws and regulations support, clarify or expand on the National Historic Preservation Act. Federal Regulations 36 CFR 800, 36 CFR 63, and Forest Service Manual 2360 (FSM 2360) contain the basis of specific Forest Service heritage resource management practices. All of these laws, regulations and direction, guide the Forest Service in identifying, evaluating and protecting heritage resources on National Forest system lands. The Forest Service is required to take into account the effect the agency's actions has on heritage resources that are either determined to be eligible for inclusion in the National Register of Historic Places (NRHP) or heritage resources that are not yet evaluated for eligibility. Eligible heritage resources are termed "historic properties". Specific locations of historic properties are exempt from disclosure under the Freedom of Information Act pursuant to 5 U.S.C. 552(b)(5).

A number of federal regulatory acts include an increasing role of tribes in the federal decision-making process. These acts include the Archaeological Resources Protection Act of 1979 which requires tribal notification and consultation where requested in regard to proposed removal of artifacts by permit from public lands; the Native American Graves Protection and Repatriation Act of 1990 which recognizes Indian control of human remains and certain cultural objects found on public lands and requiring consultation prior to authorized removal of such items; the National Historic Preservation Act of 1966, as amended in 1992, which more explicitly incorporates tribal involvement into the Section 106 consultation process and makes traditional use sites without physical remains eligible for listing in the National Register of Historic Places; and the Religious Freedom Restoration Act of 1993 which establishes a higher standard for justifying government actions that may impact religious liberties.

AFFECTED ENVIRONMENT

The Idaho Panhandle National Forests and the Colville National Forest have conducted heritage resource inventories of Forest lands beginning in 1976. From the data base of known historic properties and other relevant information, heritage specialists develop an understanding of what areas on the Forest have the greatest potential for containing historic properties. These previous inventories and accumulated knowledge guide the examination of any project area.

The chronology of human occupation of northern Idaho and adjacent areas of Washington can be broken down into three prehistoric periods. These include the Early Prehistoric Period (before 8000 years ago), the Middle Prehistoric Period (8000 to 2000 years ago), and the Late Prehistoric Period (2000 years ago to about 200 years ago). This is followed by the proto-historic period, when European cultures started to indirectly influence the Native Americans in the area (variable, but beginning in some areas 250 years ago to the actual coming of fur traders in the early 1800s).

The Kalispel and Coeur d'Alene Indians have occupied the northern Rocky Mountain area for thousands of years. Their settlements, at the beginning of the Historical Period, focused on the forest edges in valleys, around lakes and the camas grounds around Usk and Tensed. The Proto-Historic Period had a significant impact on both the Kalispel and the Coeur d'Alene peoples in the form of exotic disease epidemics, including smallpox and measles, that spread in advance of contact with white populations and wiped out whole villages. As many as one half to one third of the population of Native Americans in the Northwest died during this period.

The beginning of the Historic Period (1809 to present), in northern Idaho and adjacent Washington, is marked by the arrival of fur trader David Thompson in 1809. The subsequent fur trade era and then the coming of the Jesuit missionaries in 1841 had a powerful impact on the Indian peoples. Changes that took centuries to occur in other parts of the country, took only a few decades in the Coeur d'Alene and Kalispel areas.

The construction of the Mullan Road in 1859 to 1862 is a time marker for the Coeur d'Alene River Basin. Before construction of the road, the basin was indisputably Indian territory and had an environment largely unaffected by man. The area population and environment swiftly changed after completion of the road. Thousands of prospectors flooded into the area in search of gold and silver starting in 1884. These miners gradually fanned out from the Coeur d'Alene Valley to other areas in the Idaho Panhandle and adjacent areas of Washington and Montana. The coming of the Northern Pacific Railroad in 1882 and the Great Northern Railroad in 1892 opened up the areas for further settlement and change. By 1900, the stands of commercial white pine in forests in the eastern United States were largely removed and lumber companies moved their operations into the Northwest. The mining and logging industries combined to dramatically change the character of the population and economy of the region.

Historic properties found in the project area related to prehistoric periods, include short term habitation and resource exploitation sites, locations of religious significance and routes of travel. The Proto-Historic Period may be represented by burials of Native Americans who died from disease epidemics brought to North America by Europeans. The historic properties related to the Historic Period include sites associated with mining, logging, homesteading, transportation and Forest Service administrative history.

ENVIRONMENTAL CONSEQUENCES

Methodology

When a project is proposed, Districts routinely involve heritage specialists in developing the project and analyzing environmental effects of the project. A heritage specialist reviews previous historical work, existing archives, overviews, the nature of the project, public involvement, and consults interested Native American groups, as defined in the ICBEMP, Appendix C (Quigley and Arbelbide, 1997). The geographic scope of the heritage resource analysis is the "area of potential effects". This is the geographic area within which a Forest Service project may cause changes in the character or use of historic properties, if any such properties exist.

A. Based on the above information the heritage specialist makes a judgement about the adequacy of existing heritage information to complete the environmental analysis and disclose effects on heritage resources. If there is insufficient information, the heritage specialist will develop a strategy to correct the deficiency. Once project alternatives are developed, the District defines the "area of potential effects" on historic properties in consultation with the heritage specialist considering both direct and indirect effects. A field inspection of the project area is required where no previous adequate inventory has taken place.

B. The heritage specialist designs a field inspection of the project area to locate all historic properties within the area of potential effects. If historic properties are located in the area of potential effects, they are documented thoroughly in order to make National Register of Historic Places eligibility determinations, provide adequate information for project planning, project redesign or restrictions or designation of sensitive areas where needed. This field work and background research is documented in a report and the heritage specialist coordinates recommendations, actions and monitoring with the project leader and the State Historic Preservation Office(s).

A project has an effect on a historic property when the project activities alter characteristics of the property that qualify the for inclusion in the National Register. For the purposes of determining effect, alteration to features of the property's location, setting, or use may be relevant depending on a property's significant characteristics and are considered.

A project is considered to have an adverse effect when the effect on a historic property may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historic properties include, but are not limited to: physical destruction, damage, or alteration of all or part of the property; isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register; introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting; and neglect of a property resulting in its deterioration or destruction.

A goal of the Forest Service heritage resource program is to manage heritage resources to prevent loss or damage before they can be evaluated for scientific study, interpretive services or other appropriate uses. Timber harvest is therefore carried out to avoid adverse effects on known historic properties. Where the proposed project results in impacts to historic properties, project design anticipates from the outset that treatment of the property conforms to sound preservation practice, and is consistent with the relevant standards. Project design assures that the essential form and integrity of historic properties is not impaired. If impacts to historic properties appear to be adverse impacts, appropriate mitigation treatments are determined in accordance with 36 CFR 800.5. Mitigation of impacts for timber sales can include, but are not limited to, establishment of buffer zones, directional falling, alteration of harvest unit boundaries, changes in road locations, designation of skid trails away from historic properties, limiting the harvest methods in certain areas, seasonal limitations, and limiting slash disposal and tree planting activities.

In cases where a historic property is related to Native Americans heritage or religion, the Forest would consult with the appropriate tribal representatives to help identify appropriate mitigation measures.

In the event that cultural resources or human remains are encountered during program activities, the Forest has the authority to modify or stop harvest activities. The standard heritage resources protection provision C(T)6.24, would be included in all contracts. The provision requires that the contractors and the Forest Service representatives work together to protect historic properties. Failure of the contractor to identify historic properties encountered during the harvest constitutes a breach of contract. The provision specifically requires the contractor to notify the Forest of such discoveries.

To evaluate alternatives, the heritage specialist provides the project leader with information on all of the historic properties within the area of potential effect, their location, character, the nature of any potential effects and the possible mitigation measures of potential effects.

Direct, Indirect and Cumulative Effects at the Coeur d'Alene River Ranger District Project Area Scale

Disturbance of historic properties resulting from timber harvesting activities could potentially result from: road construction or reconstruction, tree falling, skidding, decking, and slash disposal. Certain types of historic properties are vulnerable to vandalism and looting. Construction or reconstruction of roads could result in indirect impacts by allowing the general public access to fragile historic properties.

A large portion of the Douglas-fir Beetle project area has been inventoried previously for heritage resources in conjunction with previous Forest projects. The known historic properties in the project area have been identified and considered in the development of project alternatives. The Forest is proceeding with consultation with the State Historic Preservation Office to determine the significance and effect of the project on the known historic properties. Areas not previously inventoried would be as soon as snow cover melts off and these findings would also be reported to the State Historic Preservation Officers for both Washington and Idaho. No uninventoried sale would be sold prior to the inventory and consultation with the State Historic Preservation Officers. All historic properties would be protected and any effects would be mitigated in consultation with the State Historic Preservation Offices and, if necessary, the Advisory Council on Historic Preservation, the Kalispel Tribe of Washington and the Coeur d'Alene Tribe of Idaho prior to any timber sale or other land disturbing activity.

The Forest is in general consultation with the Kalispel Tribe of Washington and the Coeur d'Alene Tribe of Idaho concerning the nature of Douglas-fir Beetle Project. Tribal representatives received briefings concerning the nature of the project and the proposed action. They were afforded the opportunity to express their concerns with the project and the DEIS. The Kalispel Tribe highlighted their concern for the protection of one particular historic property. One result of these consultations is a more detailed treatment of Heritage Resources in the Final EIS.

Consistency with the Forest Plan

Heritage and tribal interests are regulated by federal laws that provide direction and guidance to the Forest Service in identifying, evaluating and protecting heritage resources. The Forest Plan tiers to these laws and therefore, proposed action alternatives will meet Forest Plan standards.

FINANCES

REGULATORY FRAMEWORK

The IPNF's Forest Plan EIS (page IV-47) indicated, "The level of timber harvest is important not only in providing jobs in the timber industry, but also through indirect and induced impacts on other business sectors as well." One of the seven major issues for the IPNF's Forest Plan EIS was community stability (Forest Plan FEIS, pp.1-8). Forest Service policy sets a minimum level of financial analysis for timber sale planning (see Forest Service Handbook 2409.18 section 32).

AFFECTED ENVIRONMENT

Within northern Idaho, the Forest Service has been offering for sale 11 to 12 percent of the timber that was on the market the last few years. This figure is down from approximately 33 percent of the timber harvested during the late 1980s - early 1990s.

Based on the most recent information at the Forest level (TSPIRS, 1998), each million board feet of timber harvested on the Idaho Panhandle National Forests (IPNF) annually results in a total of 39.2 jobs and $1,158,000 income for that year. These figures include the impacts associated with harvesting and processing timber plus the impacts of Forest Service salaries and investment and the 25% fund expenditures.

Stumpage prices are noticeably down across the United States at present, largely due to present financial problems of the Asian nations. However, timber markets in the northwest do not seem to have been depressed as much as those in the rest of the United States. This is probably due to the growth that the region is experiencing.

The local timber market could be further depressed if the Asian economic problems continue. Due to the large diameter of the trees that would be offered for sale under this project, stumpage prices are expected to be somewhat resistant to such market conditions because historically large trees tend to be more highly valued by mills, especially if they can be peeled for veneer.

The monetary value of the trees will also depend on how soon they are harvested. Although the Douglas-fir beetle does not cause direct damage to wood it does serve as a carrier of fungal spores that can greatly deteriorate the sapwood, then penetrate the heartwood. Other beetles, such as pinhole bores, flathead borers, and roundhead borers also effect the value of beetle killed timber as they too degrade the sapwood and speed the spread of fungal rot.

Recent local sales of Douglas-fir timber by the Forest Service have brought bids of $200 to $257 per thousand board feet. Bids received by the Idaho Panhandle indicate an upward trend in the current market.

ENVIRONMENTAL CONSEQUENCES

Methodology

This analysis deals only with project level financial attributes (predicted costs and revenues) of each alternative; and approached the analysis as though each alternative, that contained timber harvesting, was a group of timber sales. The timber sales were, in turn, logical groups of proposed harvest units. An appraisal was then preformed for each group of units as though they were actually being offered for sale at this time. Thus the time value of money was not considered.

Because the market is not as robust as it has been, the analysis was made as real as possible; which was facilitated by the proposed harvest units being grouped into sale areas. Thus, stumpages and costs could be more accurately estimated and directly related to each other (so that the analysis would not be comparing

averages where stumpage would perhaps be coming from one end of the district but the costs in reality were at the other end of the district in another sale area). In order to maintain the probability of financially viable timber sales, the units can be regrouped pending actual field measurements (such as cruised volumes and specie mix) and the timber market at appraisal time.

Different revenues and costs are associated with the management activities under each action alternative. To arrive at the expected stumpages a computer program was used to determine the potential stumpage (i.e. gross bid value) of timber harvested, on a sale by sale basis. The program runs the same regression equation that is contained in the Transactions Evidence (TE) appraisal model[1], used for appraising actual timber sales. The TE appraisal method predicts the value of timber (referred to as "stumpage") through the use of several independent variables developed from recent similar sales within Region 1 of the Forest Service (northern Idaho and western Montana). Since the information used is from actual bidding, current local market conditions, and production costs for logging and milling are reflected in the predicted rate.

Other costs, such as road maintenance, fuel reduction/site preparation (burning), and planting, were developed based on experienced District costs. Road construction and reconstruction costs were based on past costs in the project area and updated to today's costs. The project file contains detailed documentation of costs estimates ("Finances").

Costs for road construction and reconstruction, reforestation, mitigation and other direct costs are deducted from the expected stumpage value. The costs of upgrading existing arterial roads (main travel/haul routes), to further reduce long-term risks to the watersheds, are included in the reconstruction costs.

The necessity of all proposed sale activity work (such as type and/or extent of fuel treatments, road work, etc) that would be required of the purchaser was continually reviewed. Within the harvesting alternatives, watershed improvement work that sale purchasers could perform was identified, such as upgrading culverts, and/or removing culverts and closing roads. Due to higher government overhead, purchaser can accomplish work more economically.

Non-commodity values were not included in this analysis because these resources are evaluated under the specific resource section. Title 40, Code of Federal Regulations for NEPA (40 CFR 1502.23) indicated that "For the purposes of complying with the Act, the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are qualitative considerations." Effects on resources are documented in individual resource sections.

The description of the features of the alternatives presented in Chapter II was used for the financial analysis. The table below identifies additional features that would affect the finances of a commercial timber sale for each alternative. No timber would be sold if Alternatives A or G were implemented.

Table III-104. Additional Features Affecting Financial Analysis of Commercial Timber Sales, Coeur d'Alene River Ranger District.

Feature	Alt. B	Alt. C	Alt D	Alt E	Alt F
Net Volume (million board feet)	43.5	43.5	51.6	40.3	37.2
Yarding Systems Used (Percent of Volume)					
Tractor	9	7	11	10	7
Skyline	31	25	37	29	33
Helicopter	60	58	52	61	60
Average Diameter of Harvested Trees (Inches)	18	18	18	18	18

[1]*The 1999 second-quarter (W99C2) Transactional Evidence (TE) model was used to arrive at the expected stumpage value for the action alternatives containing a harvesting feature.*

Table III-105. Cost Estimated for Project Activities, Coeur d'Alene River Ranger District.

Project Activity	Cost	Per Unit
Roads: Timber Sale*		
Maintenance (During Sale)	$0.54	/mile/mbf
Maintenance (Presale) (Blading plus Brushing, Cutslope)	$1,050	/mile
Reconstruction		
a) Brush Roadway and Cutslope, remove stumps, etc.	$5,000	/mile
b) Upgrade Existing Culverts	$1,500 - $20,000	/each
c) Install & Remove Culverts in Closed Roads	$3,000 - $4,500	/each
d) Install Gates	$500	/each
New Road Construction		
a) Permanent	$ 30,000	/mile
b) Temporary	$ 5,700	/mile
Culvert Removal/Road Storage	$1,300 - $3,500	/each
Fuel Treatment: Purchaser		
Helicopter Yarding Tops:	$40.00	/MBF
Skyline Yarding Tops	$5.37	/MBF
Lop and Scatter Slash	$53.85	/Acre
Grapple Pile slash with a machine (excavator)	$327.69	/Acre
Pile slash at landings:	$718.36	/Acre
Fire Line constructed by hand	$80.78	/Chain
Fire Line constructed by machine	$25.85	/Chain
Fuel Treatment: Forest Service**		
Hand Pile	$ 1,927.61	/Acre
Burn Hand Piles	$ 194.57	/Acre
Burn Grapple Piles:	$144.57	/Acre
Burn slash at landings:	$144.57	/Acre
Jackpot burn	$298.14	/Acre
Underburn in units for slash reduction and site preparation	$771.05	/Acre
Erosion Control		
Seed Skidtrails & Landings (Purchaser)	$59.00	/Acre
Noxious Weeds Control (Purchaser)	$112.50	/Acre
Essential Regeneration**		
Plant (8x8 ft spacing)	$702.46	/Acre
Stocking Surveys (3 each per acre planted)	$69.30	/Acre
Watershed Recovery Projects (Road Obliteration and Storage)***		
Recontouring	$ 4,816	/Mile
Removing Crossings	$ 1,586	/Mile
Purchase Shrubs	$ 600	/1000 shrubs
Plant Shrubs	$ 1,500	/acre/unit
Obtaining, Delivery & Placing logs	$ 2,000	/ load/unit
Seeding	$ 300	/ acre/unit
Installing Road Closures	$ 200	/each/unit

** Road Maintenance terms are defined on the Terminology insert included with the Final EIS document.*

*** Includes overhead.*

**** A site-by-site estimate of costs for road obliteration and storage is provided in the Project Files, "Finances."*

Direct, Indirect and Cumulative Effects at the Coeur d'Alene River Ranger District Project Area Scale

Timber harvest from the action alternatives would contribute to continuing operation of local mills, thus, directly and indirectly enhancing the local and state economy through employment and tax revenues. These features would also be enhanced through employment created through the planned restoration activity work outside of the timber sale contracts. Additionally, 25 percent of gross timber receipts goes directly to Kootenai and Shoshone Counties in Idaho and Pend Oreille and Stevens Counties in Washington for public schools and roads.

It is anticipated that the sale of Douglas-fir beetle killed timber, from National Forest Lands, will have very little effect on the price that private land owners will receive for their timber over the next two years for two reasons:

- *Most private landowners that also have beetle infested/killed timber have already made arrangements to have their trees harvested because the spring flight of the beetles is imminent; and they will be wanting to commercially capture the value of the trees.*

- *In the last several years, the Forest Service portion of the total sawtimber log market for North Idaho has constituted 10% to 12% of the market. The timber in this proposal will substitute for the majority of the IPNF's normal timber program for the next two years. Local timber company representatives have expressed no concerns about the Forest Service potentially "flooding the market" with Douglas-fir sawtimber.*

The following table provides a summary of the financial appraisal of each alternative.

Table III-106. Cost/Revenue Summary, Coeur d'Alene Ranger District.

	Costs/Revenue						
	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F	Alt. G
Timber Sale Revenue							
(1) Stumpage Value (gross)	NA	$9,074,000	$8,811,000	$11,293,000	$8,201,000	$7,903,000	NA
Total MMBF		43.6	43.6	51.9	40.5	37.2	0
(2) Timber Sale Costs Affecting Predicted Bid							
(3) Road Maintenance (During)	$0	$143,000	$143,000	$191,000	$128,000	$108,000	$0
(4) Road Maintenance (Presale)	$0	$101,000	$101,000	$114,000	$101,000	$78,000	$0
(5) New Road Construction (including new rd oblit)							
a) Permanent Road Construction	$0	$0	$0	$150,000	$0	$0	$0
b) Temporary Road Construction	$0	$119,000	$0	$187,000	$125,000	$59,000	$0
(6) Road Reconstruction							
a) Brushing, ditch and shoulder earth work:	$0	$98,000	$92,000	$139,000	$98,000	$66,000	$0
b) Upgrading existing culverts:	$0	$216,000	$216,000	$240,000	$216,000	$0	$0
c) Installing & Removing Culverts in Closed Rds.:	$0	$66,000	$66,000	$66,000	$66,000	$19,000	$0
d) Install Gates on roads presently closed (for WL) :	$0	$27,000	$27,000	$29,000	$27,000	$22,000	$0
(7) Road Obliteration & WL Closures (Sale Contract)	$0	$71,000	$71,000	$72,000	$71,000	$48,000	$0
(8) Seed skid trails & landings	$0	$58,000	$58,000	$48,000	$60,000	$28,000	$0
(9) Slash Disposal/Site Prep (Purchaser)	$0	$1,860,000	$1,892,000	$1,648,000	$1,802,000	$1,019,000	$0
(10) Slash Disposal/Site Prep (FS)	$0	$788,000	$788,000	$1,536,000	$435,000	$4,214,000	$640,000
(11) Noxious Weed Control (Purchaser)	$0	$18,000	$18,000	$18,000	$18,000	$16,000	$0
(12) Total Sale Contract Costs = Sum line 3 through 10	NA	$3,565,000	$3,464,000	$4,438,000	$3,147,000	$5,677,000	$640,000
(13) Predicted Bid Value (net) = Line 1 - Line 12	NA	$5,466,000	$5,316,000	$6,821,000	$5,054,000	$2,224,000	NA
(14) Predicted bid/MBF = Line 13/ Line 2	NA	$125	$122	$131	$125	$60	NA
Other Project Costs							
(15) Reforestation	$0	$681,000	$672,000	$923,000	$323,000	$615,000	$0
(16) Road Obliteration (FS) for watershed restoration	$0	$268,000	$268,000	$683,000	$268,000	$172,000	$1,328,000
(17) Road Closure for Wildlife Security (FS)	$0	$28,000	$28,000	$28,000	$28,000	$20,000	$0
(18) Total Other Costs = Line 15 + Line 16 + Line 17	$0	$977,000	$968,000	$1,634,000	$619,000	$807,000	$1,328,000
(19) Minimum Bid that would fund all Projects	NA	$4,542,000	$4,432,000	$6,072,000	$3,766,000	$6,484,000	NA
(20) Per MBF = Line 18/Line 2	NA	$22	$22	$31	$15	$26	NA
(21) Difference Between Predicted & Minimum Bid per MBF= Line 14 - Line 20	NA	$104	$100	$101	$110	$32	NA
Other Forest Service Costs							
(22) Planning	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000	$800,000
(23) Sale Preparation	$0	$1,196,000	$1,196,000	$1,424,000	$1,111,000	$1,021,000	$0
(24) Harvest and Engineering Administration	$0	$178,000	$177,000	$227,000	$169,000	$143,000	$7,000
(25) Net Value (line 13-line 22-line23-line 24)	($800,000)	$2,358,000	$2,206,000	$2,770,000	$2,355,000	($545,000)	($2,775,000)
(26) Present Net Value (Discounted)	($800,000)	$2,399,813	$2,253,451	$2,878,491	$2,344,212	($516,320)	($2,492,926)
(27) 25% Fund (County) = Line 12 *0.25	$0	$1,377,000	$1,337,000	$1,714,000	$1,264,000	$557,000	$0

* Costs of FS Road obliteration in Alternative G include reconstruction, maintenance and obliteration.

Definitions

The **stumpage value** in the table reflects the size of timber harvested (average diameter), volume per acre, species composition, planned yarding method (helicopter, skyline, cable or tractor) and hauling distance (on paved and unpaved roads). **Timber sale costs** are those other costs that are considered in the timber purchaser's bid including contractual requirements. The timber purchaser is billed for Forest Service slash treatment to be completed after the sale.

The **predicted bid** is the stumpage price, minus the total of the other contractual costs. The estimated bid per thousand board feet is calculated by dividing the predicted bid by the estimated volume. Generally, the predicted bid is expected to be lower than the historical local bid for this type of timber, due largely to the value of the contractual items planned. Normally, a timber sale would not have as much road obliteration or reconstruction which is planned for watershed restoration. The other contractual items are generally indicative of the type and amount of contractual work required in a timber sale.

The **value of timber sale projects** was determined by adding all the contractual items, plus the cost of regeneration. This number indicates how much "cushion" is available in the bid before some of the projects would not be funded. It shows how much the price of a bid could fall, on the average, due to market forces and still cover anticipated work. On a sale by sale basis, this number was used to determine below cost sales when the value of timber sale projects was higher than the predicted bid sale area, by alternative.

Alternatives B, C, E and F would produce forest products over both the short and long terms; traditional employment opportunities in the woods product industry would be similarly affected. Employment opportunities would also occur from planned restoration under all action alternatives.

Not managing the timber resource in this area (as under Alternatives A and G) would result in a loss of mature timber (of commercial size) to disease and insects, and would result in the loss of productivity over the long term. This directly relates to expected ***future*** revenues.

Timber sales offered under this proposal would be in replacement of other planned sales for the next one to two years, thus the local timber market is not expected to be affected by an additional large volume of timber.

Effects of the Opportunities

Timber Management Financial Viability

Implementing stand-management treatments would depend on having financially viable timber sales that the local forest products industry is willing to purchase. Generating funds to help finance watershed and wildlife projects while having sales that are not below cost is also desirable. For this analysis, all identifiable costs associated with the timber sales (administration, mitigation, monitoring, sale preparation, and sale execution), were included.

Below Cost Sales

When viewed as individual potential sale areas, all modeled action alternatives with timber sales contain below cost sales, i.e.; where projected costs for planning, field prep, and sale administration) were not fully covered by projected stumpage. Alternatives B and C both have two sale areas out of 18 areas below cost. Alternatives D has three out of 18 areas below cost. Alternative E has three out of 21 areas below cost. Eight

out of the 12 sale areas modeled in Alternative F are below cost. As modeled, six of the eight below cost sales in Alternative F also showed expected total costs to be greater than the expected stumpage value. The higher costs in Alternative F reflect the higher level of work that is being proposed to reduce the wildfire risk in the urban interface.

Alternatives B, C, and D each contain a sale area with contractual costs projected to be above expected stumpage value. One sale area with this trait is common to both Alternatives B and C. Pending a continued upward trend in the timber market, coupled with exact conditions measured in the field and the freedom to recombine the units with adjacent sale areas, the sale areas could result in minimum bids being above costs. Alternative D has one sale are with costs projected to be above the expected stumpage value. In potential sale areas where contract costs are above predicted bid, road work or units may be shifted to another sale to improve the financial condition at the time of sale package preparation.

Alternative G does not contain timber sale activities.

When the action alternatives containing timber sales are viewed as entire projects, only Alternative F shows as being below cost. Five of the twelve in Alternative F have contractual costs much higher than the expected stumpage value and thus would also be much more difficult to improve their financial viability at the time of sale package preparation.

Cumulative Effects

Timber sales offered under this proposal in the Newport, Priest Lake and Coeur d'Alene areas would be in replacement of other planned sales for the next one to two years on both National Forests, thus an additional large volume of timber would not affect the regional timber market. Additional timber from private and state sources may have already landed in the market at a higher rate that would normally have occurred.

Consistency With the Forest Plan

Forest-wide goals, objectives, and standards for finances are not specifically addressed in the Forest Plan. This issue is addressed indirectly in the discussion of community stability. Chapter II of the Forest Plan states, "Management activities will continue to contribute to local employment, income, and life-styles. The Forest will be managed to contribute to the increasing demand for recreation and resource protection while at the same time continuing to provide traditional employment opportunities in the woods product industry," (Page II-11, Objectives).

All the alternatives meet this Forest Plan direction.

TRANSPORTATION PLANNING

The transportation planning for this EIS is tiered to the Forest Plan, but has a higher degree of specificity. The goals for transportation facilities in the Forest Plan Chapter II state in part:

- *Construct the minimum number of roads necessary to permit the efficient removal of timber and mineral resources. Construct and reconstruct roads only to minimum standards necessary to prevent soil loss, maintain water quality, minimize safety hazards for a reasonable and prudent Forest user, and provide access for fire protection where needed to meet management area goals.*

- *Maintain a balance of open and closed roads to continue present levels of motorized access, insure big-game habitat security, and reduce road management costs.*

The existing roads coverage was developed from the geographic information systems (GIS) roads layer for the Coeur d'Alene River Ranger District. The six analysis areas cover approximately 165,000 acres of U.S. Forest Service land. Within these analysis areas are approximately 1,633 miles of road. (This includes both system and nonsystem roads.) Approximately 1,168 miles (71%) of these are within the forest boundary.

The interdisciplinary team compared the existing roads to the long term transportation plan to determine if they were necessary to retain as permanent roads. Those roads not necessary for long term management became opportunities for closure or restoration as defined in the purpose and need for this project.

Roads used to haul and yard timber would be placed on a Level Two or Three maintenance schedule during the life of the sale. The roads which are gated, and would be used for timber yarding and haul only would be maintained for low speed travel and for use by high clearance vehicles (Maintenance Level 2). Those which would also be used by the public would be maintained for travel in a standard passenger car (Maintenance Level 3). These roads would be maintained for low speed and would be single lane with turnouts and spot surfacing.

The next step in the process was to develop a specific transportation plan for this project. Alternatives were developed that considered building only temporary roads, a combination of temporary and system roads, as well as no new roads. The ID team proposed a system road (Alt. D only) when it accessed a regeneration unit and was over 3000 feet long. This would allow the district access for managing the long term stand tending needs associated with regeneration harvest. All other roads were considered temporary.

New system roads would have drainage crossings requiring a minimum amount of maintenance installed (e.g. vented fords). These drainage structures would meet INFS requirements. A barrier closure would be required upon completion of use. All new system road construction which has associated landings would have the landings designed into the roadbed.

All new roads would be built to a 10 m.p.h. safety standard.

Temporary roads would be built, utilized, and obliterated in the same season under timber sale contract provision CT6.4, except for those roads needed for post-sale activities (i.e. tree planting, slash treatment). Obliteration would consist of removing and recontouring all stream crossings and, as needed, recontouring unstable fill slopes, stabilizing the cutslopes, installing no-maintenance cross ditches, and revegetating disturbed soil. All new construction of temporary roads would install drainage structures which meet INFS standards. These roads would be obliterated upon completion of use .

Roads which currently have the drainage structures removed and are needed for yarding or haul of timber would be reconstructed and have structures installed which meet INFS requirements. Upon completion of sale activities these roads would be made hydrologically inert and returned to their presale access condition.

The management of each road was determined by using the logging systems plan for each alternative. The Coeur d'Alene River Ranger District has a relatively high road density, primarily due to the historic jammer logging which required road spacings 300 to 400 feet apart on the hillslope. Despite this, many areas that have been attacked by the beetle have relatively few roads and helicopter yarding is required on over 50 percent of the acres being analyzed. The transportation plan located in the project file displays the harvest method and the roads used to harvest each unit. The management of each road during and after the sale can be found in the Road Management Plan by alternative also located in the project file.